Rock Products

With which is Incorporated CEMENT and ENGINEERING NEWS Founded 1896

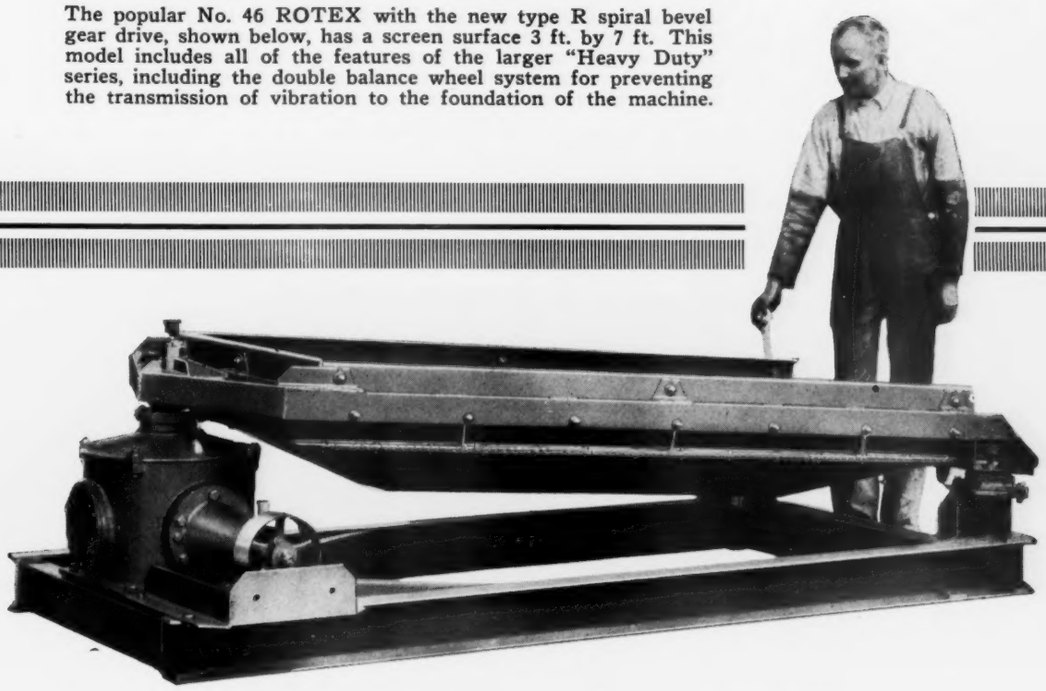
Chicago, August 3, 1929 (*Issued Every Other Week*) Volume XXXII, No. 16

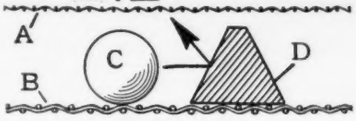
MEMBER A. B. C. *The Largest Paid Circulation Covering The Rock Products Industry* MEMBER A. B. P.

Next Issue Will Be August 17

ROTEX

The popular No. 46 ROTEX with the new type R spiral bevel gear drive, shown below, has a screen surface 3 ft. by 7 ft. This model includes all of the features of the larger "Heavy Duty" series, including the double balance wheel system for preventing the transmission of vibration to the foundation of the machine.





A—Screening mesh.

B—Coarser ball supporting screen.

C—The solid rubber balls flying about, due to the gyrating action of the screen box, strike the inclined surface D and are deflected upward, hitting the under side of the screening mesh.

Rapid, Accurate Screening

Time devoted to screening should be the time in which profitable production is accomplished. No time here for tinkering with untimely repairs — neither can you earn maximum profits from clogged screens. Screening surface means little if a certain area of that surface is constantly clogged. THINK IT OVER!

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Then, too, the ROTEX gives you ACCURATE SEPARATION due to the nearly level position of the cloth surface and large level circular path of the screen which slides the material rapidly over the surface.

The use of carefully tested materials — heavy construction and waterproof and dustproof design, plus correct lubrication, tends to still further protect users of ROTEX Screens against excessive upkeep costs and interrupted service. Write for detailed information today.

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Entered as second-class matter, July 2, 1907, at the Chicago, Ill., postoffice under the Act of March 3, 1879.

Contents for August 3, 1929

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Volume XXXII Chicago, August 3, 1929 Number 16

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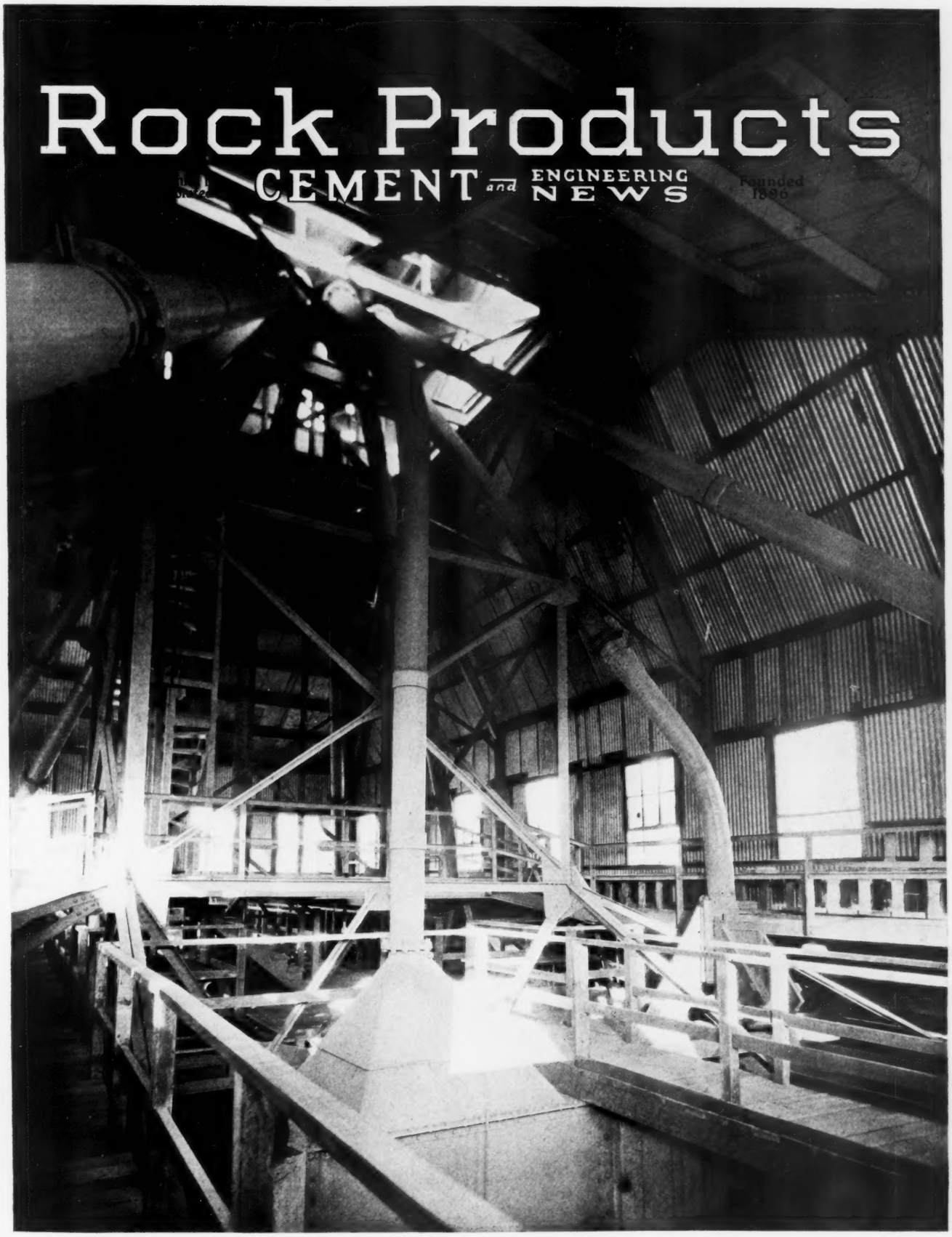
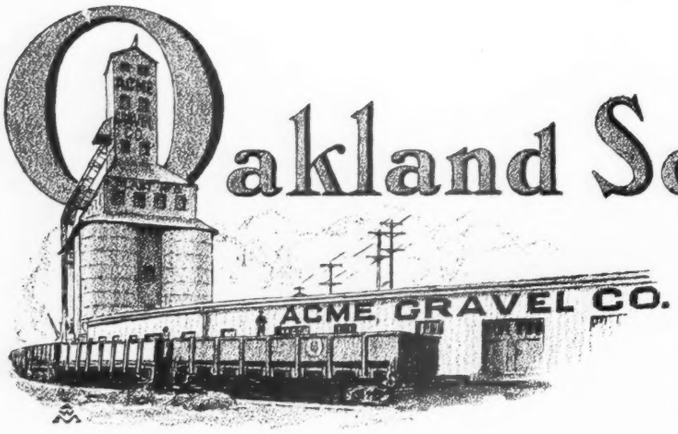
Founded 1896



Interior of the Acme Gravel Co.'s distributing plant at Oakland, Calif. The spouts distribute sand, gravel or stone to the different bins underneath



Oakland Service Plant of

By Gordon Smith

THE DESIGN and arrangement of the Peralta street retail bunker plant of the Acme Gravel Co. at 26th and Peralta streets in Oakland, Calif., presents a unique solution of the problem of handling building materials for retail distribution.

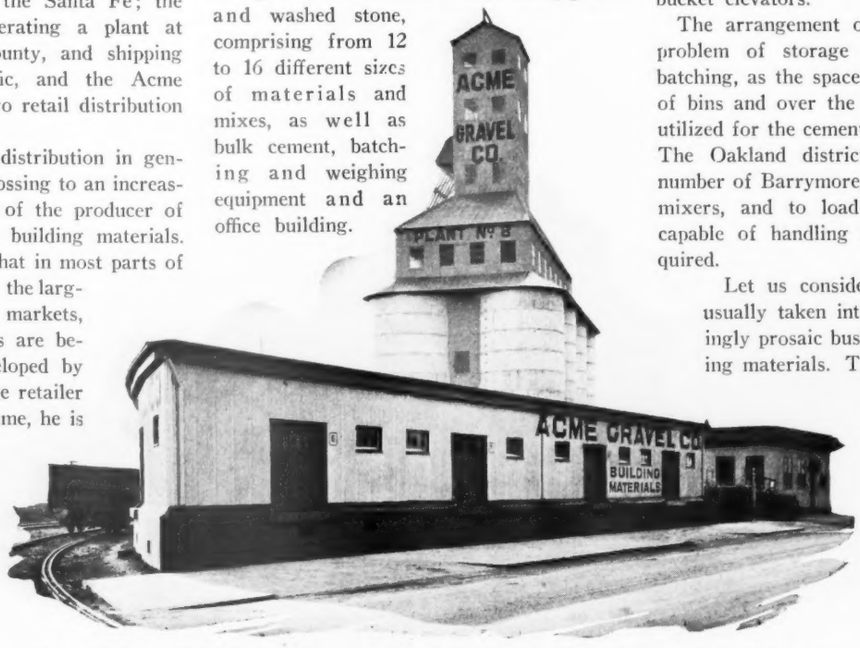
This plant was built in 1927 for the Acme Gravel Co., a subsidiary of the Associated Gravel Co., with offices in the Pacific Mutual building, 704 Market street, San Francisco. William H. Ford is president; E. B. Kendall, vice-president and general manager, and S. E. Beveridge, secretary and treasurer. The parent company, which was organized in 1925 to acquire and consolidate the producing and distributing facilities in the sand, gravel and crushed stone industry owned and controlled by Mr. Ford owns and operates: the Niles Sand Gravel and Rock Co. at Niles, Calif., shipping on the Southern Pacific and Western Pacific railroads; the River Rock Gravel Co., operating a plant near Tracy, shipping on the Western Pacific; the Riverbank Sand Co., with plant at Riverbank, shipping on the Santa Fe; the Coyote Gravel Co., operating a plant at Coyote, Santa Clara county, and shipping on the Southern Pacific, and the Acme Gravel Co., operating two retail distribution yards in Oakland.

The subject of retail distribution in general is one which is engrossing to an increasing extent the attention of the producer of concrete aggregates and building materials. This is due to the fact that in most parts of the country,, particularly the larger and more congested markets, the distributing facilities are being taken over or developed by the producer. Where the retailer is strong enough in volume, he is in many cases acquiring or developing his own production. The trend in the building materials business is following that of other industries toward the elimination of the much talked of "middleman" and toward the consolidation in one organization of production and distribution.

The factors governing the choice of structures and equipment for retail distribution are many and varied and an attempt here to point out even a few of the more important is irrelevant. A brief discussion of the requirements of the Acme Gravel Co. in the development of their facilities at the Peralta street yard is, however, of decided moment when considered in connection with a description of the plant.

Available Area Restricted

In the first place the ground area available for this plant was restricted. The tract (see property map) available is roughly triangular in shape, comprising the area between Peralta street and the Southern Pacific siding, with a frontage on Peralta street of about 345 ft. and a width at the open end of the wedge of about 145 ft. The total area available is approximately 30,000 sq. ft., and on this space was to be built a one-story warehouse for cement (sacked), plaster, wall board, insulation and similar specialties; a storage for around 4000 tons of sand, gravel and washed stone, comprising from 12 to 16 different sizes of materials and mixes, as well as bulk cement, batching and weighing equipment and an office building.



The Oakland distributing plant of the Acme Gravel Co. Storage for 4000 tons of sand, gravel and stone as well as bulk cement is provided

It is at once apparent that, due to restricted space, the tonnage required and the various sizes involved, ground storage was out of the question. Bin storage was the alternate, and to efficiently handle truck loading with weighing batchers, circular concrete bins were decided upon, each having a capacity of about 500 tons, and the eight bins were arranged in two rows of four each with a truckway under each row of bins and a truckway between the two rows. It is also possible with this type of bin to divide each into two, three or four sections, thus providing for as many as 32 different materials. To eliminate the fire hazard it was decided to make the super-structure of steel frame construction with corrugated iron covering.

The next problem was the choice of unloading and elevating equipment. A skip hoist system with the skips running in balance with automatic loaders fed from a track hopper into which cars might be dumped was chosen, due to the fact that this type of equipment is of proven reliability and minimum operating expense, requires less power than any other elevating means, and, once started, requires no attention, as the operation is 100% automatic. Maintenance on this type of elevating equipment is admittedly lower than with chain or belt and bucket elevators.

The arrangement of the bins solved the problem of storage of bulk cement and batching, as the space between the two lines of bins and over the center drive might be utilized for the cement bins and the batchers. The Oakland district uses a considerable number of Barrymore, Paris and other truck mixers, and to load these large batchers capable of handling 5-ton mixes were required.

Let us consider one more item, not usually taken into account in the seemingly prosaic business of retailing building materials. The advertising value of a fine retail distributing plant is no mean item. Everyone likes to do business at a fine store. Marshall Field has proven that statement, as every married man whose wife has ever lived in, or visited, Chicago knows. There is no

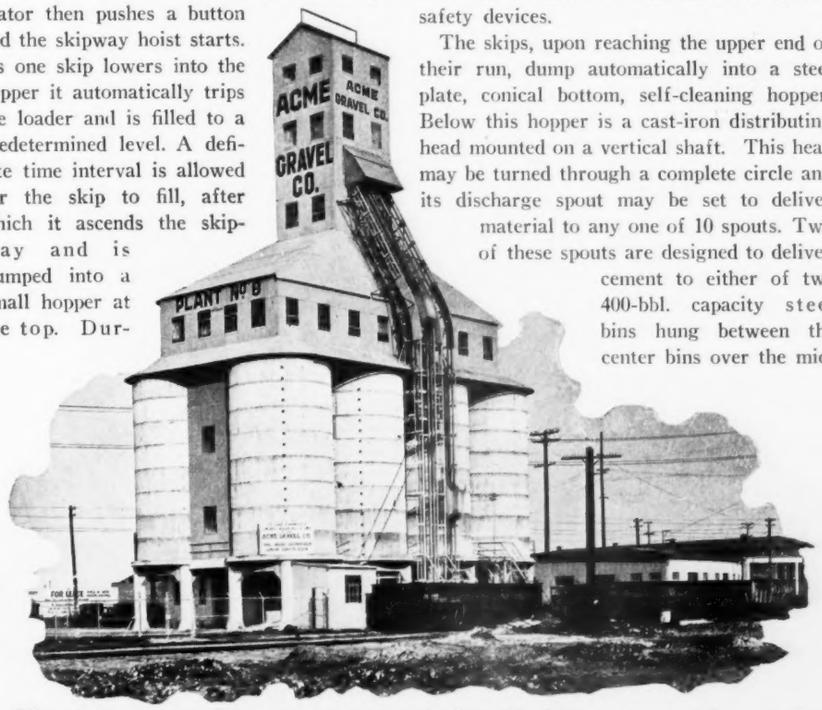
the Acme Gravel Company

reason to doubt that the same holds true of any other retail business, and that it may be further asserted that the retail dealer in building materials may expect many an order if he has installed well designed, substantial and imposing facilities with which to carry on his business. Further, such orders will come in at good prices, because the customer is attracted by reason of the confidence established in his mind by the appearance of the plant with which he deals.

The detailed description of the plant shows how the J. C. Buckbee Co. of Chicago, consulting engineers for the Associated Gravel Co., met the requirements set forth above.

Simple Operating Cycle

The operating cycle is extremely simple, as it should be in any such plant. Cars of sand, gravel, stone or plant-made concrete mixtures are spotted on the track hopper by an electric car puller and dumped. The operator then pushes a button and the skipway hoist starts. As one skip lowers into the hopper it automatically trips the loader and is filled to a predetermined level. A definite time interval is allowed for the skip to fill, after which it ascends the skipway and is dumped into a small hopper at the top. During the time of this ascent the other skip bucket descends, and, while the first skip is being dumped, the second has tripped the automatic loader and received its charge in turn. The cycle is then repeated automatically and continuously until the operator shuts it down from the push-button control.



The eight storage bins are so arranged that 32 different materials may be loaded to cars or motor trucks. A skip hoist is used to elevate materials to the distributing spouts in the plant

The skips are of 40 cu. ft. (2 tons) capacity each and the operating cycle is so timed as to deliver a loaded skip at the dumping bin on top every 72 seconds, resulting in an hourly capacity of 100 tons, or two cars of material. The track hopper is of steel, suspended in a concrete-walled pit. The loaders are attached to the steel hopper, which is completely self-cleaning. This latter feature permits cars of different materials to be dumped in rapid succession, it only being necessary to allow enough time between cars for the hopper to be emptied.

The skip hoist is powered by a 30-hp. General Electric motor. The skips are of self-cleaning automatic dumping type and all steel. These run in steel skipways carried on the concrete tanks and steel superstructure. The skips, loaders, skip hoist, cables, sheaves, etc., were furnished by the Link-Belt Co., who also furnished the Cutler-Hammer automatic control and electrical safety devices.

The skips, upon reaching the upper end of their run, dump automatically into a steel plate, conical bottom, self-cleaning hopper. Below this hopper is a cast-iron distributing head mounted on a vertical shaft. This head may be turned through a complete circle and its discharge spout may be set to deliver material to any one of 10 spouts. Two of these spouts are designed to deliver cement to either of two 400-bbl. capacity steel bins hung between the center bins over the middle driveway. The other eight spouts deliver to a point central over each of the concrete aggregate bins. At the end of those spouts delivering to a bin which has had partitions installed is a discharge box arranged with gates to discharge into either of the two, three or four parts of the bin formed by the partitions. The spouts are of steel pipe with bolted flanged connections.

The well-designed and imposing appearance of the plant is an excellent advertisement for the company

The distributing head is turned to the proper bin from an indicating latched lever stand on a floor at the level of the top of the bins. The indicating lever is attached directly to the lower end of the vertical shaft itself and, by means of a simple thumb latch, may be locked in place when the distributor has been turned to deliver into the proper spout.

Due to the fact that the property on which

Trucks may be loaded directly underneath the bins

The storage bins are arranged in two parallel rows of four bins each. Three weigh batchers are installed in the space between the bin rows

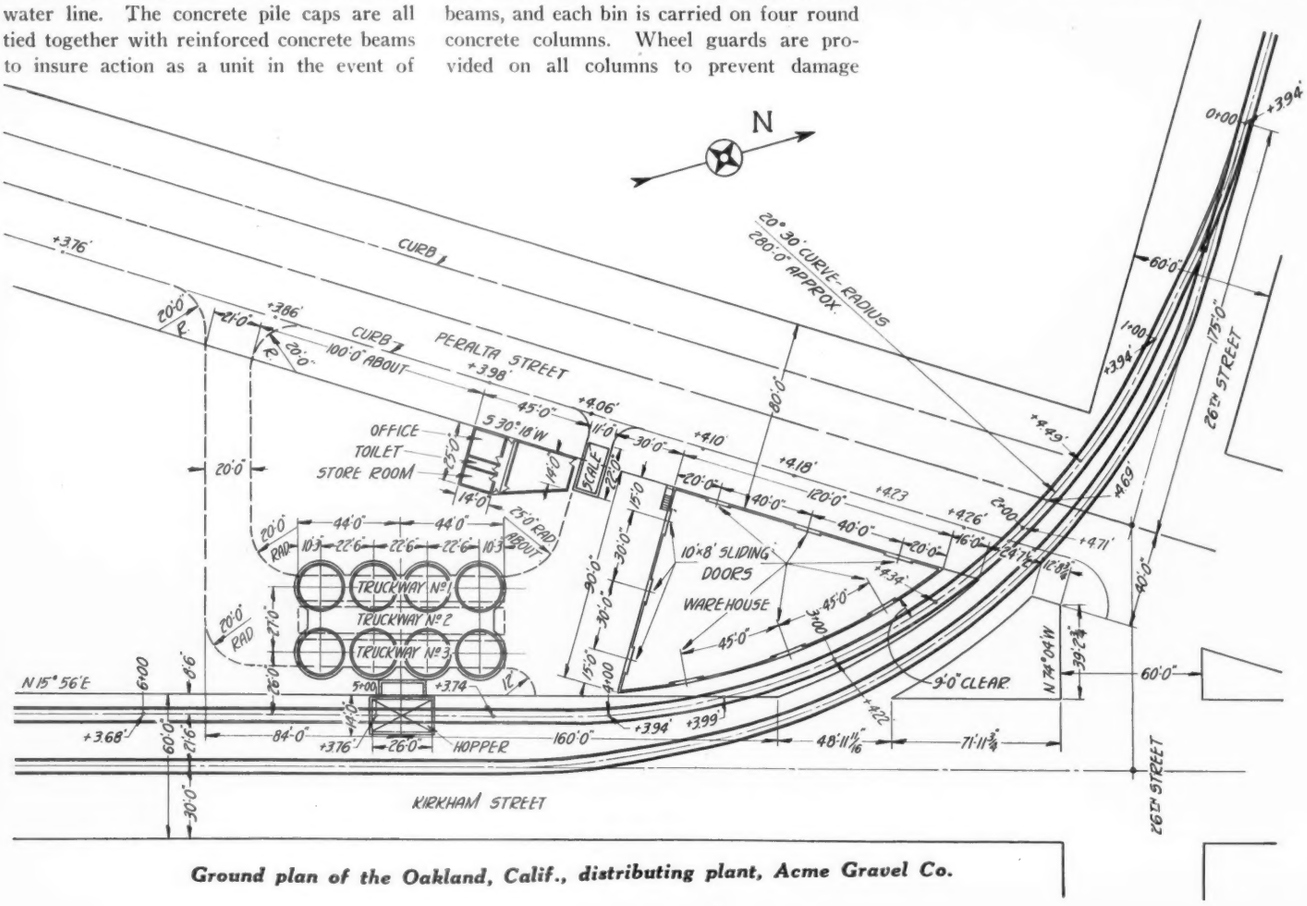
the plant is located is all filled ground, having once been part of a tidal marsh, the bin columns are all carried on pile footings, the piles being cut off 5 ft. 8 in. below the general grade to keep them below the standing water line. The concrete pile caps are all tied together with reinforced concrete beams to insure action as a unit in the event of ground disturbance.

Each circular bin is 20 ft. outside diameter with 6-in. thick side walls. The floor is 14 ft. above grade and the bins are 36 ft. deep. The floor structure is a slab supported on beams, and each bin is carried on four round concrete columns. Wheel guards are provided on all columns to prevent damage from the trucks. The column spacing and beam arrangement is such as to maintain 11 ft. overhead and 11 ft. side clearance in all three truckways.

As mentioned before, the bins are arranged in two rows of four each, with one driveway under each row and a third center drive under the space between the rows. The bins are 22 ft. 6 in. on center in each row, with the rows on 27-ft. centers. The floor is extended to completely cover the space between the tanks. Each tank has four chute-type, self-locking gates installed in the floor, which permits loading material direct into trucks passing below the bins. The gates are so arranged that one is in each quarter of the bin, thus providing ample truck loading facilities for each bin when the partitions are in place.

The three 5-ton Johnson weigh batchers are installed in the space between the bin rows. The accompanying drawing showing the batcher arrangement indicates clearly the manner in which this installation is made. The aggregates are delivered to the batchers through quadrant type side gates in the bin walls, the operating levers for these gates being conveniently grouped near the scale beams on the batchers.

Cement is stored in bulk in two 400 bbl. steel bins hung between the center bins and is delivered to the batchers by means of motor operated screw conveyors. These are started and stopped by push button controls located on the same operating stand from



Ground plan of the Oakland, Calif., distributing plant, Acme Gravel Co.

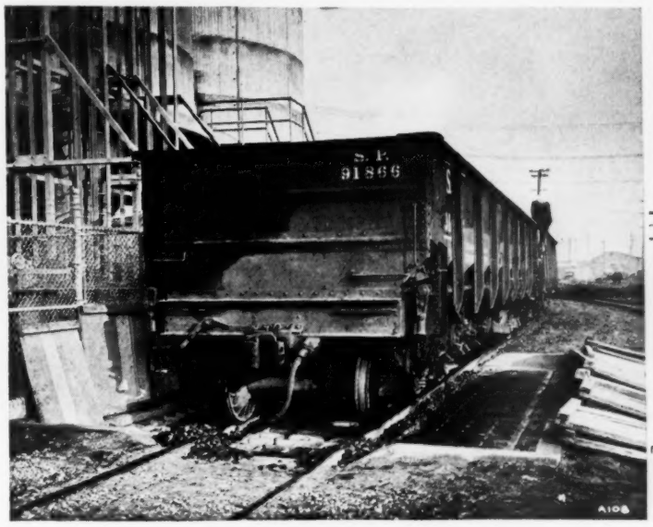
which the aggregate spouts are controlled.

The design of the aggregate bins has been very carefully worked out as to size of bins, thickness of walls and size of structural members so that most economical use of structural materials has been made. The superstructure carrying the upper end of the skipway, spouts, etc., is entirely of steel frame construction carried on top of the bins. This superstructure, as well as the space between the tanks and over the batcher floor, is completely enclosed. Corrugated iron was used for siding and roof and a well lighted interior is assured by generous use of ventilating steel sash.

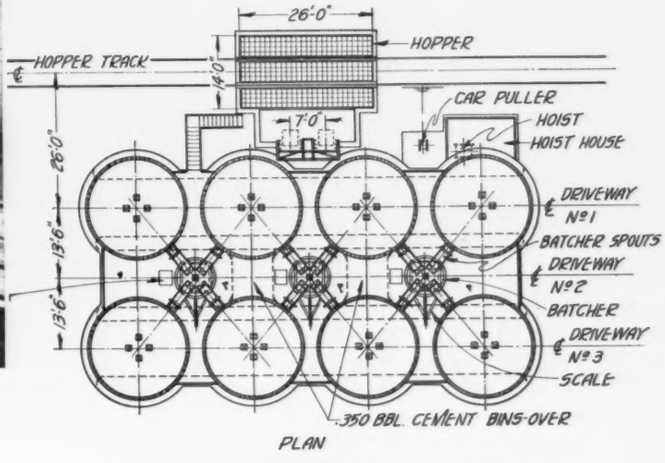
The P. J. Walker Co. were general contractors on the job, doing the piling and concrete work themselves, and having the steel fabricated by the Pacific Coast Engineering Co. The general scheme of the entire plant was conceived by J. C. Buckbee, president of the J. C. Buckbee Co., engineers of Chicago, and patents have been granted covering the same. This firm did all of the engineering and design work in connection with the entire Peralta street yard.

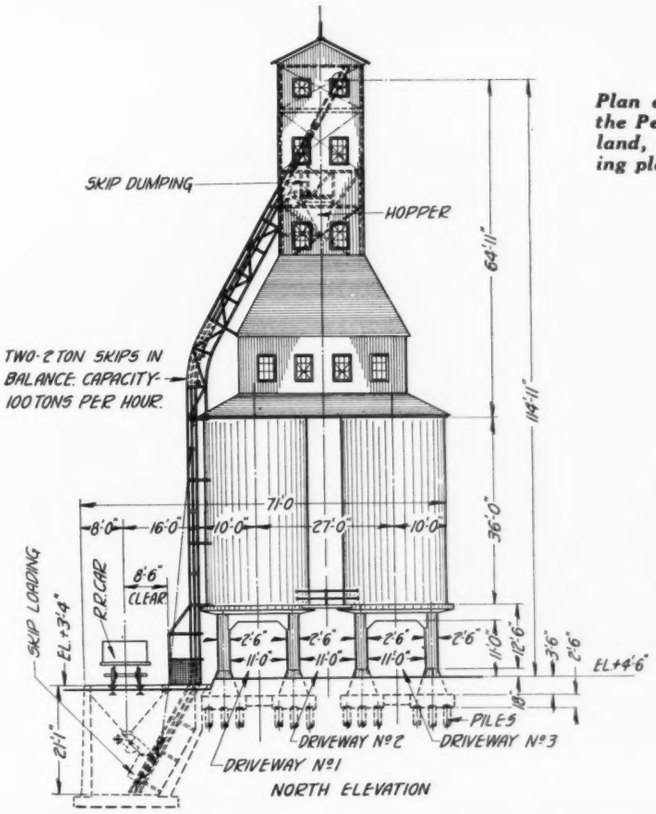
The office building is of stucco construction, 40x25 ft. in plan, and contains two private offices, waiting room and general office. as well as a shower and toilet room. The warehouse is of heavy timber construction carried on piling, built for a floor load of 300 lb. per sq. ft. This building, triangular in shape, covers 11,500 sq. ft.

This plant, we believe, is the finest material handling plant built to date, as well as the most economical, from both an operating and a first cost standpoint.

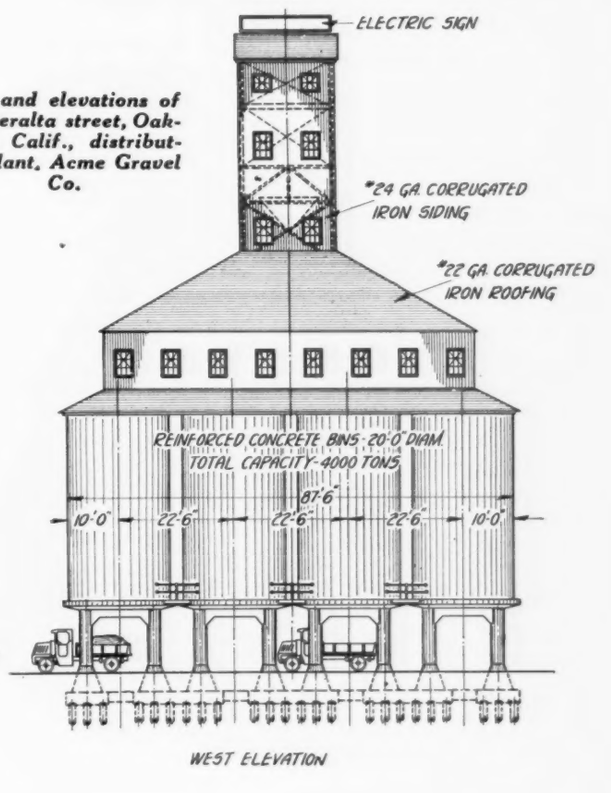


Cars dumping into the receiving hopper



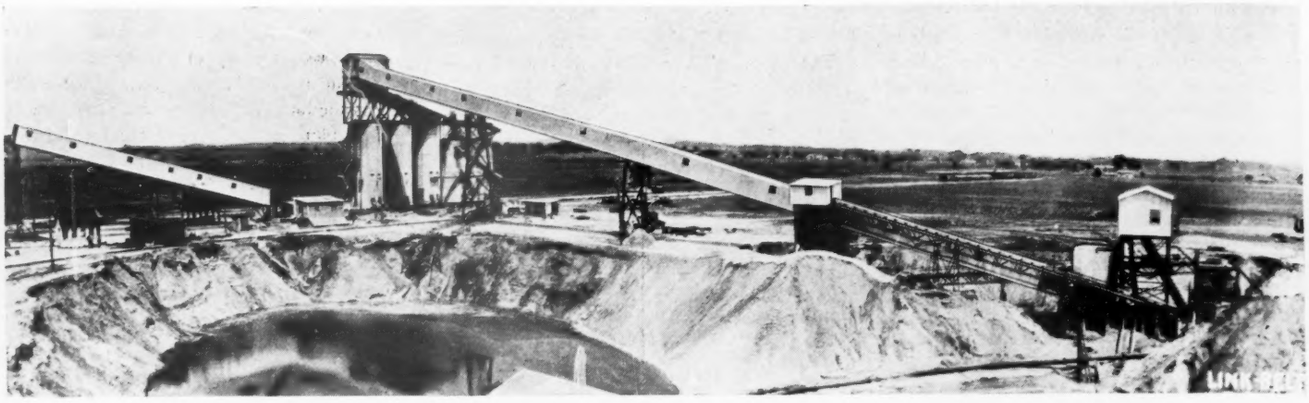


Plan and elevations of the Peralta street, Oakland, Calif., distributing plant. Acme Gravel Co.



Mining Industry of Idaho

THE 13th annual report of the mining industry of Idaho for the year 1928 has been issued under the direction of Stewart Campbell, inspector of mines. The report covers 270 pages of information on the mineral resources of the individual counties as well as market information and a general review of 1928 activities.



General view of the new plant of the Terre Haute Gravel Co., Terre Haute, Ind.

Terre Haute Gravel Co.'s New Plant Has Many Novel Features

A Large Capacity Plant That Embodies 30 Years' Experience in the Gravel Business

GEORGE J. NATTKEMPER, vice-president of the Terre Haute Gravel Co., Terre Haute, Ind., has been active in the sand and gravel industry for a great many years, and during that time has seen the industry grow from the shovel-wheelbarrow stage to its present commanding position in America's industrial life. During that time he has built and operated many plants. Combining this vast experience and training in his latest plant, located about four miles northeast of Terre Haute, he has obtained a large capacity operation which is remarkably efficient, both as to cost of production and cleanliness of material produced.

The plant has a rated and actual capacity of 4000 tons per day of 10 hours, and at present employs 22 men on the day shift and 5 on the night. As the plant is still considered in the constructive state, a few extra men are kept employed, although only 17 are required for normal operation of the plant. The design and layout of the washing equipment, bins and loading mechanism are such that any grade or kind of commercial aggregate or railroad ballast can be loaded. This includes the ordinary sizes of gravel and sands, any of which can be loaded separately or as remixed aggregates.

The company's deposit comprises 130 acres of gravel-bearing ground with no overburden, favorably located as to railroad shipping facilities, being served by the Pennsylvania railroad, Big Four and the C. and E. I. The Chicago and Milwaukee lines also pass within a short distance of the plant, but do not make rail connections. These rail connections are a convenience to to the various railroads, enabling them to secure ballast, and naturally are a source of considerable revenue to the Terre Haute Gravel Co.

The plant and acreage representing an investment of $500,000, replaces all the other plants and pits formerly operated by the company at Terre Haute and Summit Grove. To realize a profit, despite present low prices for gravel in the district, the company recognized that a large, centrally located and efficient production unit was necessary. Hence this new plant at which they will confine their activities. The plant, which is of steel and reinforced concrete construction throughout, was designed cooperatively by the Terre Haute Gravel Co. and the Link-Belt Co. Steel for the dredge structure was fabricated by the Hetherington and Berner Co. of Indianapolis and the corrugated iron was supplied by the Braden Manufacturing Co. The structural steel in the plant was fabricated by the Insley Manufacturing Co., Indianapolis.

Preliminary washing and screening plant

Excavation Methods

Gravel is taken from the deposit by a suction dredge which was built by the company at the site of its launching. The pond for floating this equipment was first excavated by a Sauerman dragline cableway excavator. At present, owing to the depth of the deposit (85 ft. of which 60 ft. is below the water level and 25 ft above water), only a shall dredge pond has been formed; consequently the excess sands and silt from the washer

The dredge working in the pond

plant are not being returned into the pond, but carried in a launder to a circular concrete sump tank that feeds an 8-in. Hetherington and Berner centrifugal pump directly connected to a 250-hp. Western Electric induction motor operating on 2200-v., 3-phase and 60-cycle current. This pump delivers the waste material to a depression about 2800 ft. from the plant.

The dredge is of steel construction throughout and has a plan dimension of 60 ft. by 28 ft., and draws 2½-ft. Its hull consists of 20 water-tight compartments, all riveted and then electric-welded. The suction boom is capable of digging to a depth of 60 ft. Total weight of the dredge is about 175 tons.

The 15-in. Amsco dredge pump sets in a pit about 4 ft. deep and has as a base two layers of 6-in. planking that act to absorb any vibration, both pump and planking being bolted to the dredge hull proper. This pump is driven by a 350-hp. Allis-Chalmers, 505-r.p.m., 2200-v., induction motor, with the bearing between motor and pump water-cooled.

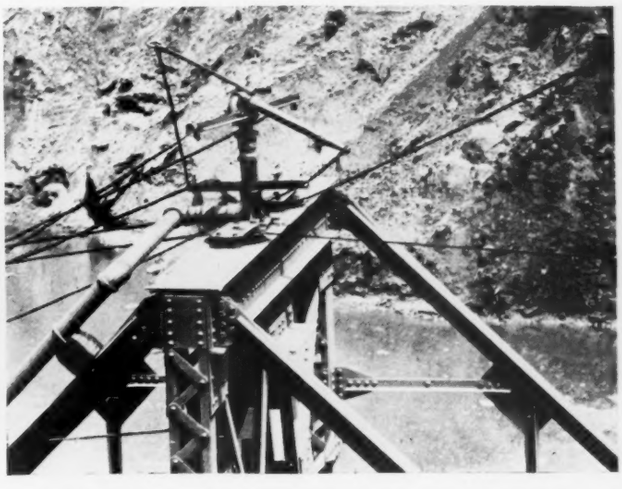
An unusual feature of this operation, which incidentally is coming into more general use at other similar operations, is the use of a hydraulic monitor for caving the bank that is above the water level. This monitor uses a one-inch nozzle, made by the Samuel Eastman Manufacturing Co., is mounted on the front end of the dredge in such a manner that the operator can control its direction by remote wire controls. Water is delivered to the pump by a two-stage Dravo Doyle 800-r.p.m. centrifugal pump at 265-ft. head. This head corresponds theoretically to 115-lb. pressure. The pump is direct connected to a 75-hp., 1750-r.p.m., General Electric, induction motor. A second 2-in. Gould centrifugal pump driven by a 5-hp. motor is used for priming.

The suction boom supporting the suction pipe and the chain digger for loosening the sub-aqueous gravels is raised and lowered by a double-drum hoist equipped with a solenoid brake on the outboard bearing of the 20-hp. driving motor. The digger chain is driven by a 20-hp. General Electric motor through a set of open gear reductions. A single overhead monorail on which rides a 3-ton Moore Manufacturing Co. chain block passes over the top of all the heavier pieces of equipment.

The pump sludge is delivered at present a distance of approximately 150 ft. to a small hopper ahead of two 48-in. by 12-ft. Worthington scalper or primary screens, the stream being split by a suitable baffle so that each unit gets its share of material.

Hydraulic monitor employed in cutting down the banks is mounted on front end of the dredge

Drive mechanism for digging ladder, mounted on deck

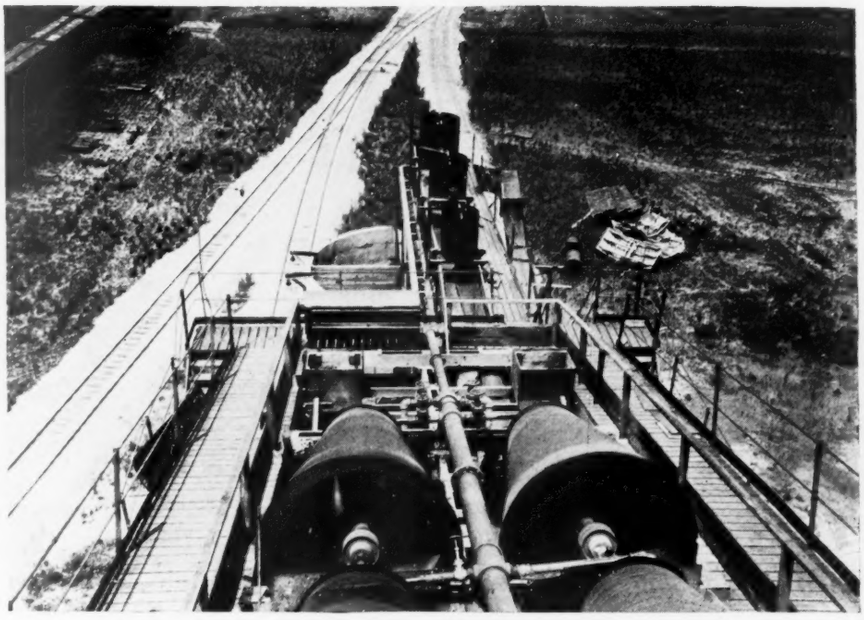


Details of the nozzle mounting showing the wire controls

These screens were part of equipment in use at one of the company's older plants and have slight difference in general design. No. 1 has 12 ft. or 3 sections of 1¾-in. square perforations, and No. 2 has 2 sections of 2-in. square perforations and one end section of 1⅝-in. square perforations. On this screen the smaller perforations are on the discharge end, hence that section is practically non-operative. Both of these rotary screens are driven by a single 20-hp. Allis-Chalmers motor through a Link-Belt silent chain drive and open chains and sprockets.

The oversize from the two rotary screens fall to an inclined 28-in. belt conveyor that delivers to a hopper-bottomed bin serving two gyratory crushers. One of the gyratories is an 8-in. Worthington and the other a No. 4 "McCully." Each is driven by 25-hp. Allis-Chalmers motors through 8-in. rubber belts.

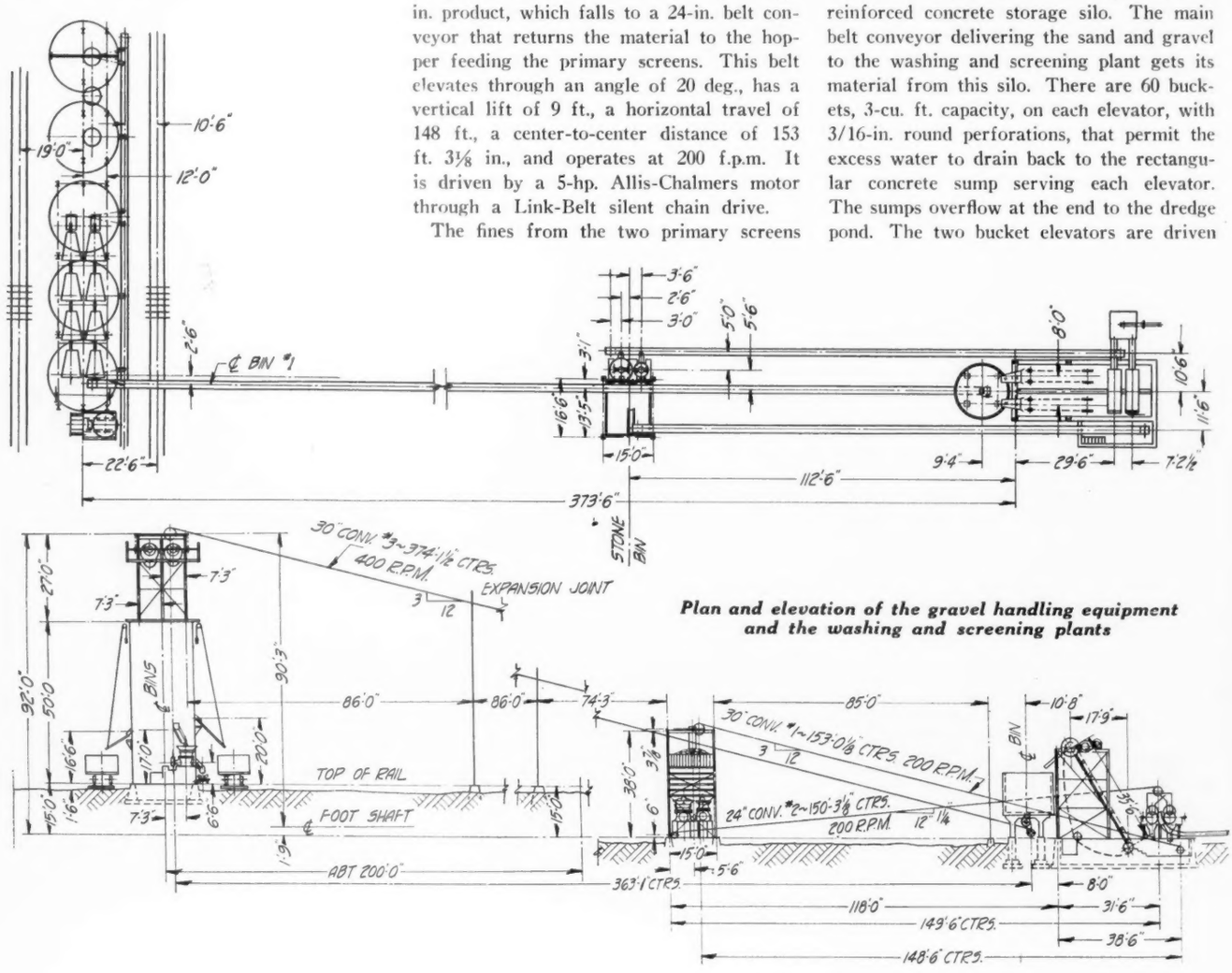
The belt conveyor handling the uncrushed oversize is inclined at an angle of 18 degrees, has a vertical lift of 38 ft., a horizontal movement of 102 ft., a center-to-center distance of 153 ft. 8 in., and operates at 200 f.p.m. The belt is driven by a 10-hp. Western Electric motor through a Link-Belt silent chain drive and open gear reductions.



Looking down on the conical screens and sand classifiers

Both crushers are set to discharge a 1¾-in. product, which falls to a 24-in. belt conveyor that returns the material to the hopper feeding the primary screens. This belt elevates through an angle of 20 deg., has a vertical lift of 9 ft., a horizontal travel of 148 ft., a center-to-center distance of 153 ft. 3⅛ in., and operates at 200 f.p.m. It is driven by a 5-hp. Allis-Chalmers motor through a Link-Belt silent chain drive.

The fines from the two primary screens fall to separate inclined bucket elevators; one elevator provides for each screen and delivers the product to a single circular reinforced concrete storage silo. The main belt conveyor delivering the sand and gravel to the washing and screening plant gets its material from this silo. There are 60 buckets, 3-cu. ft. capacity, on each elevator, with 3/16-in. round perforations, that permit the excess water to drain back to the rectangular concrete sump serving each elevator. The sumps overflow at the end to the dredge pond. The two bucket elevators are driven



Plan and elevation of the gravel handling equipment and the washing and screening plants

by a single 50-hp. Allis-Chalmers motor and a Link-Belt silent chain drive. These elevators are of special design of the Link-Belt Co.

By the use of these elevators a preliminary washing is given to the sand and gravel. At the same time they act as a dewaterer for the dredge's output and eliminate sending unwanted fine sand to the washing plant, which would otherwise be the case, as the deposit averages about 50% gravel and 50% sand, of which a considerable part of the sand is too fine for commercial purposes. This fine portion of the sand is for the most part eliminated here and the remainder at the subsequent washing operations. In regard to the gravel, about 10% has to be crushed, most of which is between 2 in. in diameter, with exceptional pieces somewhat larger than that size.

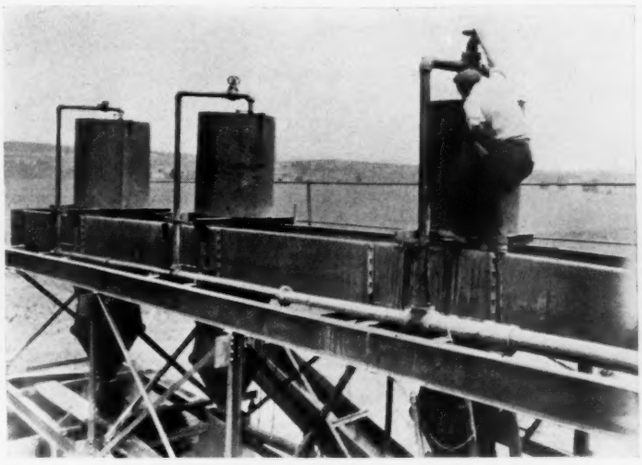
All of the primary washing and screening equipment so far described is in the open without any covering with the exception of the drive mechanism of the bucket elevators and the drive of the oversize conveyor. The other motors are all enclosed in wood housings to protect them from possible damage in inclement weather.

The circular storage bin at the bucket elevators acts as a surge tank between the preliminary and final washing plant, and insures a continuous operation of either half of the plant in the event of breakdowns in the other half. The tank has a diameter of 15 ft., is 12 ft. deep, and holds 80 cu. yd. of material.

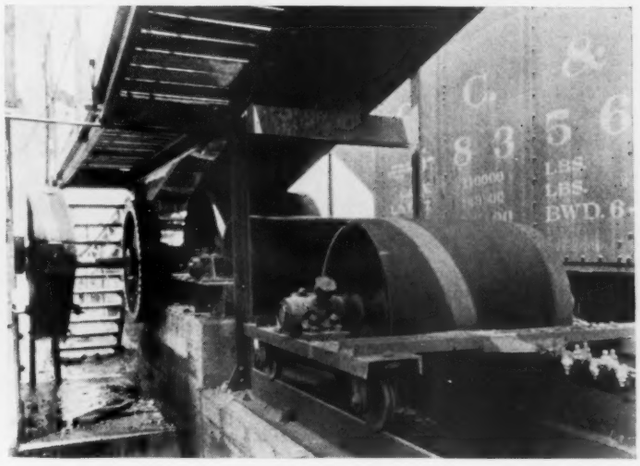
It discharges to a Link-Belt 30-in. belt conveyor through a roll feeder driven from the tail pulley of the belt conveyor. When the dredge is delivering a material containing a high percentage of gravel, this works very successfully without an attendant, but when the bank is high in sand the feeder must be adjusted again by means of a horizontal gate operated through a rack and pinion. This adjustment only regulates the size of the opening through which the material flows, as the drum runs at constant speed.

The belt conveyor receiving the sand and gravel from the above feeder elevates a vertical distance of 92 ft. with a horizontal movement of 363 ft. and a center-to-center distance of 374 ft. The angle of inclination is 18 deg. from the horizontal.

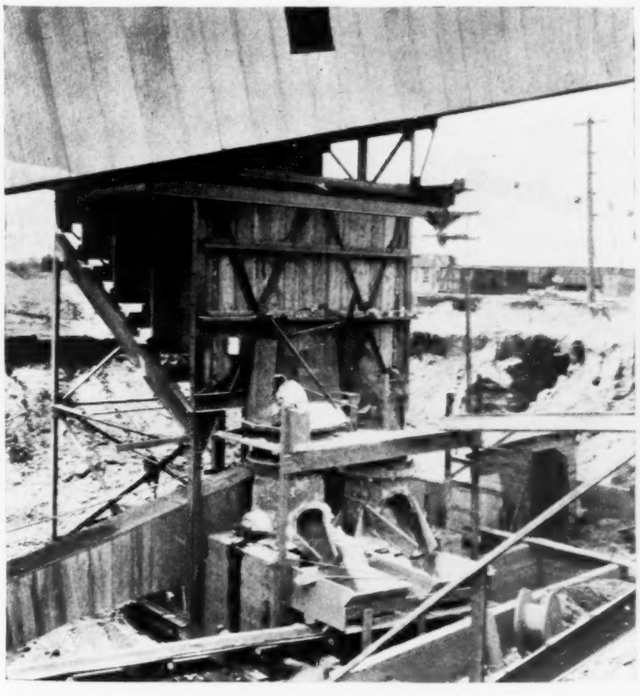
The material received by this belt is saturated with water and at the steep inclina-



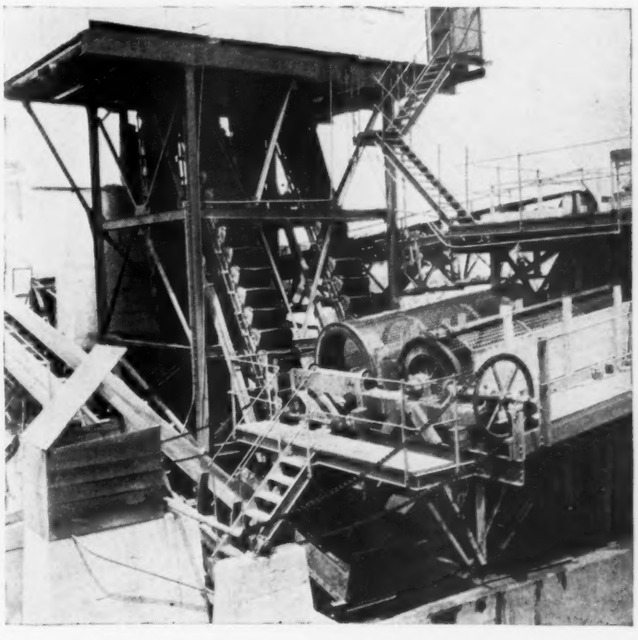
Regulating the water supplied to the sand classifier; these are hindered settlers of a type recently developed



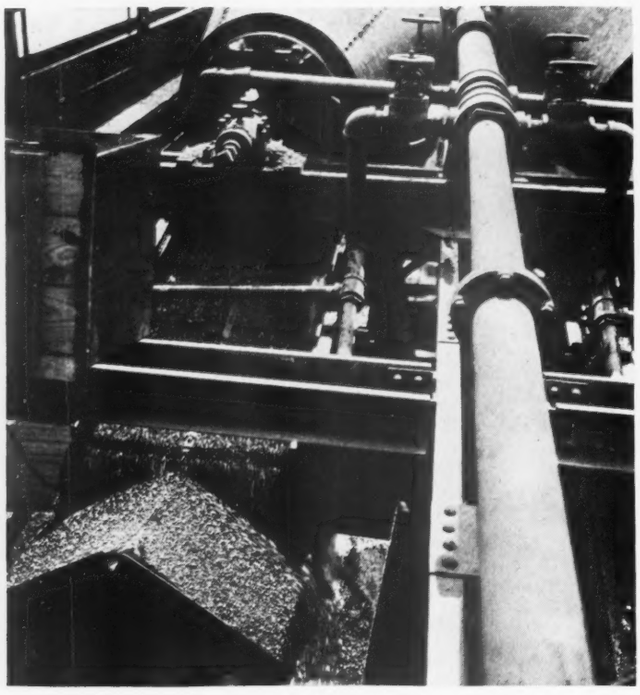
The takeup for the loading conveyor is mounted on flanged wheels



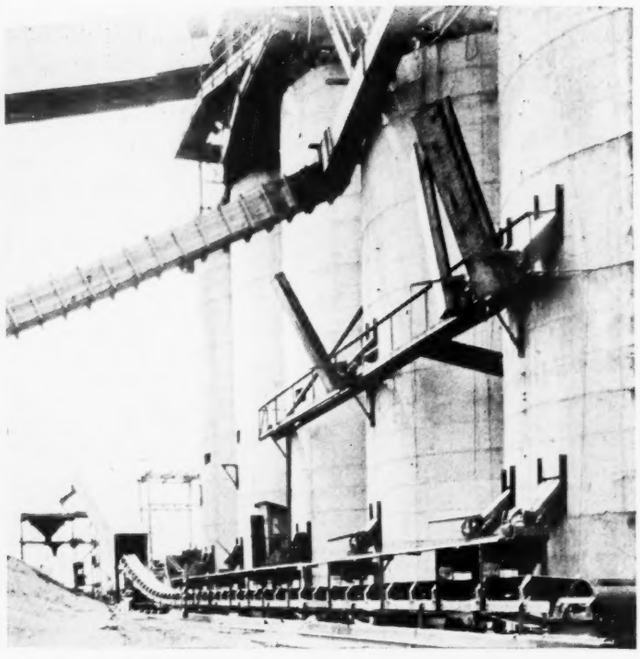
Oversize from the primary screens is recrushed and returned to the scalpers



The primary rotary screens and the dewatering elevators which serve to give sand and gravel preliminary washing. They also eliminate the sending of unwanted fines to the washing plant



Vibrating screen serving the conical screens. This screen acts as a cleaner for the pea gravel



Unloading arrangements at the storage silos. The belt conveyor is for carrying mixed aggregates or ballast to the cars

tion there is a slight tendency for the sands to flow back on the belt. This is, however, offset by operating the belt at 400 f.p.m. or a higher lineal speed than most carriers of this type usually are run. The carrier rolls are Link-Belt 3-roll Timken roller bearing idlers equipped with Alemite nipples for lubrication. They are spaced at 4 ft. intervals and the return idlers are spaced on 10-ft. centers. The belt is driven at the head pulley through a Link-Belt silent chain drive and open gear reductions by a 75-hp. General Electric motor.

The sand and gravel stream discharged from this belt splits and is divided between two sets of Link-Belt Dull conical screens, all having round perforations, the sized holes being successively 1½ in., ¾ in., ⅝ in. and ¼ in. Water from a 6-in. line centers at the head screen of each set and additional water is also supplied each cone by a 1½-in. pipe from a main header.

Car loading at the storage silos. The wooden flume at the left carries waste from the washing plant to the circular tanks from which it is pumped to the waste pond

Approximately 25% of the total water delivered from a 10-in. centrifugal pump operating under a 145-ft. head goes to the head screen of each Dull battery with 5% supplied to each separate conical screen, the remaining 10% being used in the Shaw sand classifiers and at the car loading operation. The Dull screens are driven as a unit by a 20-hp. Allis-Chalmers motor.

Screens of this type are quite successful on keeping the wash waters out of the bins and materials; this is particularly noticeable at this plant.

The ¼-in. to ⅝-in. material from the end of the last Dull screen falls to the Type N.P.-135 Link-Belt vibrating screens equipped with a single 3x5-ft. deck of ¼-in. wire cloth. There is one screen of this type serving each set of conical screens and additional water is sprayed on to the pea gravel as it flows over the face of the screen. Each screen is belt-driven by a 2-hp. General Electric motor.

The vibrating screen receives a very heavy flow of material, but nevertheless an efficient cleaning operation results. The various sized gravels fall to circular concrete silos below and the sands from the end conical screen flow with all the wash water through a steel launder to a battery of three Shaw sand classifiers. The first classifier produces concrete sand and the third the mason's sand, with the middle Shaw classi-

fier so located that it can be used to produce either coarse or fine sands.

The Shaw classifier is one of the later additions of sand settlers of the Link-Belt Co. and operates on the hindered settling principle. This classifier was described in detail in the "New Machinery" section of ROCK PRODUCTS, October 29, 1928, and also in the December 8, 1928, issue as part of the series of articles on "Sand Settling" by Edmund Shaw, the inventor, who is also a contributing editor for ROCK PRODUCTS.

The bottom of the launder from which the Shaw classifier receives the sands to be classified is open, but the classifier for the finer sands has this opening covered with a perforated plate and ⅛-in. wire screen cloth. The operating officials were very well pleased with this installation, particularly as to the cleanness of the sands produced through its use.

The plant also produces a sand or gravel locally referred to as "bird's-eye," by passing the coarse sands from the first Shaw classifier over a third Link-Belt vibrating screen similar to those previously described, but equipped with a 10-mesh screen. This screen is placed just below the classifiers. All the sizes of sands produced fall to circular concrete storage silos below.

Storage and Loading Facilities

There are three reinforced concrete silos for gravel and two for sands, the two end gravel silos being provided with a single wood partition. The gravel silos are 50 ft. high and 20 ft. outside diameter, each holding 500 cu. yd. of gravel. The sand silos are 40 ft. high and are of similar diameter and hold 400 cu. yd. of material. Combined storage capacity of these bins is therefore sufficient to hold three to four hours' output, making it unnecessary to operate continually the car loading equipment.

Cars can be loaded from either side of the plant by means of a suitable hinged spout by simply spotting the car at the desired bin. However, for mixed aggregate, ballast, etc., the cars are loaded by a belt conveyor running parallel to the long railroad track but on the opposite side of the plant from the main line railroad track.

This belt conveyor passes horizontally by the bottom and at the sides of the bins receiving the predetermined amounts of material from each bin, through an under-cut quadrant gate. The gate for the sand is of this type also, but has special devices to prevent sand leakage when closed. This belt was supplied by the Cincinnati Rubber Co.

It was planned to place a small crusher

The mixed aggregate conveyor discharges to a hopper under which cars are loaded

to recrush the larger sized material from the Dull screens, discharging this material to the loading belt, but this crusher has not been installed.

The belt, after passing the end silo, starts up a small incline for a distance of 175 ft., discharging to a hopper over the mechanical spreader car loader. The loader belt travels 128 ft. in a horizontal direction with an inclined movement of 170 ft. with the multiple drive being at a point where the belt starts up the incline. The belt travels at the rate of 400 ft. per min. and will load at the rate of 600 tons per hour. The loading belt is driven by a 50-hp. motor through a silent chain drive and open gear reductions.

Directly under the steel hopper served by the above conveyor is the reciprocating loader, which is simply a spout mounted on wheels made to ride a suitable track. Mechanical means are provided to cause this spout to travel back and forth spreading and mixing the various aggregates across the width of the car. This not only mixes the material but also loads it in such a fashion as to reduce segregation to a minimum. The spreader is driven from the head pulleys of the conveyor through an open chain drive. The material before passing to the hopper can, if desired, flow over a stationary screen for a final cleaning and washing.

The cars for loading pass directly under the hopper and are spotted by a 50-ton Davenport saddle-back steam locomotive The locomotive's services are required at all times during the loading, as the spreader does not have a longitudinal movement.

Water Supply

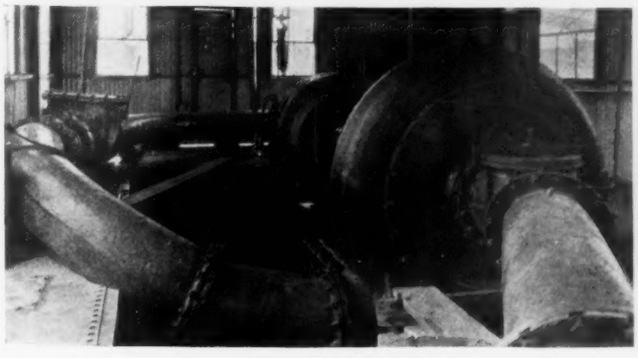
Water is supplied from a circular well 40 ft. in diameter and 20 ft. deep, the sides of which are lined with reinforced concrete. The pump is mounted on a platform hung by eight ⅞-in. rods from cross timbers at the surface, two rods being at each corner of the platform. The platform is 4 ft. above water level at the beginning of pumping operations, but this is soon lowered to 8 ft. where constant water level is reached.

There is a single-stage, 10-in. Dean Hill Pump Co., Anderson, Ind., centrifugal pump direct connected to a 125-hp. General Electric motor, which at 1750 r.p.m. delivers water under 145-ft. head.

The company maintains a repair shop housed in a concrete block building in which can be found an assortment of shop equipment, including two lathes, a power hack saw, drill press, etc.

Personnel

The executive offices of the Terre Haute Gravel Co. are in the Terre Haute Trust building, Terre Haute, Ind. J. R. Connelly is president; George J. Nattkemper, vice-president; W. F. Nattkemper, secretary, and C. F. Connelly is treasurer. Rudolph Nattkemper is superintendent.



The 15-in. suction pump on the dredge

A corner of the repair shop

A Most Modern Crushing Plant in the Southern Granite Region

All-Steel and Concrete Construction Features the Rock Chapel Operation of the Consolidated Quarries Corp.

THE CAROLINAS, especially North Carolina, are well supplied with granite crushing operations in almost all parts. South Carolina also is in the granite region but has not so many plants as its northern neighbor, for the simple reason that the market for crushed stone does not exist. While the awakening of the industrial south was markedly noticeable first in North Carolina, now South Carolina and Georgia are beginning to realize that the development of their natural wealth, both mineral and argicultural, is hindered by lack of highways and hard-surface roads. To correct this condition both states have bond issues totaling $150,000,000 before their respective legislatures, the money secured from the sale of these bonds to be spent on systematic programs of highway construction.

Several crushed granite operations in South Carolina are in various stages of development, some new plants built, some building and many still in promotional stages; it remained for Georgia, however, to secure what without question is one of the most modern and well designed and constructed plants of its kind in the entire granite region of the south Atlantic states.

The plant was built for the Consolidated Quarries Corp., an interlocking company with the Piedmont Corp., which operates a crushed stone plant using underground mining at Chestatee, Ga. The new operation is located at Rock Chapel, De Kalb County, Ga., a small settlement near Lithonia. This latter town is 25 miles from Atlanta, Ga., on the Central of Georgia railroad, to which road the company has built a spur connecting the main line with its property.

This plant was inspected early this year and a brief mention made regarding its operation in the April 13 issue of Rock Products.

The company owns 400 acres, most of this area embracing a small granite mountain somewhat similar to Stone Mountain on which the famous Confederate memorial was until recently being carved. This famous granite mountain lies a few miles westerly from Rock Chapel, the name given the mountain which is the site of the new crushed stone operation.

One of the unbroken faces of massive granite

The rock is almost identical with the more familiar gray granites of Stone Mountain which are used for dimension stone, a product which is shipped over a wide area. The deposit is a solid mass of granite and on one portion of the mountain which was used as a source of dimension stone some fifteen years ago can be found a solid face well over a 100 ft. in length and 10 to 12 ft. high without a crack or crevice over the entire face.

It is interesting to note that in this region water follows the horizontal crevices or seams in the granites, so that by sinking a well to one of these bedding planes excellent water can be secured, but at this site a churn drill has sunk a hole to a vertical depth of 470 ft. and no water has been encountered. The purpose of this hole is to secure a water supply for domestic uses.

Granites are regarded as igneous rock, and where they grade off into gneisses and schist, these rocks are regarded as alteration products through metamorphic agencies. They can be considered, from their position in the earth's crusts, as a plutonic rock. That is to say, a rock which under certain peculiar conditions of heat and pressure has cooled from a molten state, but at varying, and great depths under masses of underlying rock into which the molten mass was intruded. Wherever granites are exposed, it is due to the eroding away and removal of the covering rocks by the agencies of weathering.

From these conditions of slow cooling the holocrystalline and granular structure of the granite are derived with their interlocking crystals that give this granite such great strengths.

Granites were at one time considered as the world's oldest rocks, but, on the contrary, they are found breaking through rocks of all ages up to late Mesozoic and early Tertiary times; but they do, however, occur most frequently with the older rocks of earth's crust.

The Geological Survey of Georgia

Rock Chapel, a mountain of solid granite. The quarry is being opened at the right; at the far upper left can be seen an earlier dimension stone operation

The new crushing plant of the Consolidated Quarries Corp., at Lithonia, Ga., as seen from the quarry site

made an analysis of the Rock Chapel quarries, with the following results:

Silica (SiO_2)	73.86	Titanium dioxide (TiO_2)	0.36
Alumina (Al_2O_3)	15.00	Magnesia (MgO)	0.23
Potash (K_2O)	3.42	Sulphur trioxide (SO_3)	0.19
Soda (Na_2O)	2.98	Maganous oxide (MnO)	trace
Lime (CaO)	1.04	Carbon dioxide (CO_2)	
Phosphorus pentoxide (P_2O)	0.96	Moisture at 100 deg. C.	0.14
Ferrous oxide (FeO)	0.70	Loss on ignition	0.54
Ferric oxide (Fe_2O_3)	0.62		100.35
Ferrous sulphide (FeS)	0.31		

The Pittsburgh Testing Laboratories several years ago made a report covering the physical properties of this particular granite, with the following results:

Per cent wear	3.2
Hardness	18.3
Toughness	13.0
Weight per cu. ft. (lb.)	164.0
Crushing strength, lb. per sq. in.	13,018
French coefficient	12.8

The deposit is also unusual in that it is absolutely free from overburden, there being hardly 250 tons of what could be considered overburden on the entire mountain whose surface has been worn smooth by weathering agencies.

At present drilling preparatory to blasting is under way at a point near the foot of the mountain, and at a few feet elevation above the ground floor of the plant and at a point about 300 ft. from the primary crusher. Eventually there will be a face along the foot of the mountain 800 to 1000 ft. long, and as the work progresses into the mountain a face will be developed that will have a height of 150 ft.

The drilling at first was all being done by four X-71 Ingersoll-Rand tripod drills, which were putting down 3-in. dia. holes to a depth of 24 in. on 6-ft. centers and 6 ft. contours, using 1½-in. steel. The close spacing was deemed necessary for the first shot as the blasting will be in the solid rock.

Due to the fact that they are still in the process of opening up the quarry, blasting methods are not standardized. At present the holes are placed 8 ft. apart with a 10 ft. burden, and are 20 ft. deep. These are collared at 3¼ in. and bottomed at 2¼ in. The holes are loaded with approximately 30 lb. of 60% quarry gelatin and fired with No. 6 electric blasting caps. Each hole breaks approximately 130 tons. At present the highest place in the quarry face is about 35 ft.; this is being worked in two benches. Holes on the bench are blasted approximately the same as those on top and are dulled 2 ft. below the quarry level.

The plant was designed co-operatively by F. M. Weakley, mechanical engineer of the W. P. McDonald Constr. Co., and the engineers of the Allis-Chalmers Manufacturing Co. The construction work was done by the Wm. P. McDonald Construction Co., Flushing, N. Y., which has a branch office in the Arcade Bldg., Lakeland, Fla. Robert Blower was the resident engineer and A. J. Brown the construction superintendent.

The entire structure is of steel and reinforced concrete, and represents an investment of $600,000. The conveyor galleries as well as the various crushing and screening units are all housed with Conklin "Diamond" brand tin plate siding.

Tripod drilling preparatory to opening the new quarry

The capacity of the plant has been very conservatively placed at 200 tons per hour, and will employ 40 to 50 men, 8 of which will be in the crushing and screening plant.

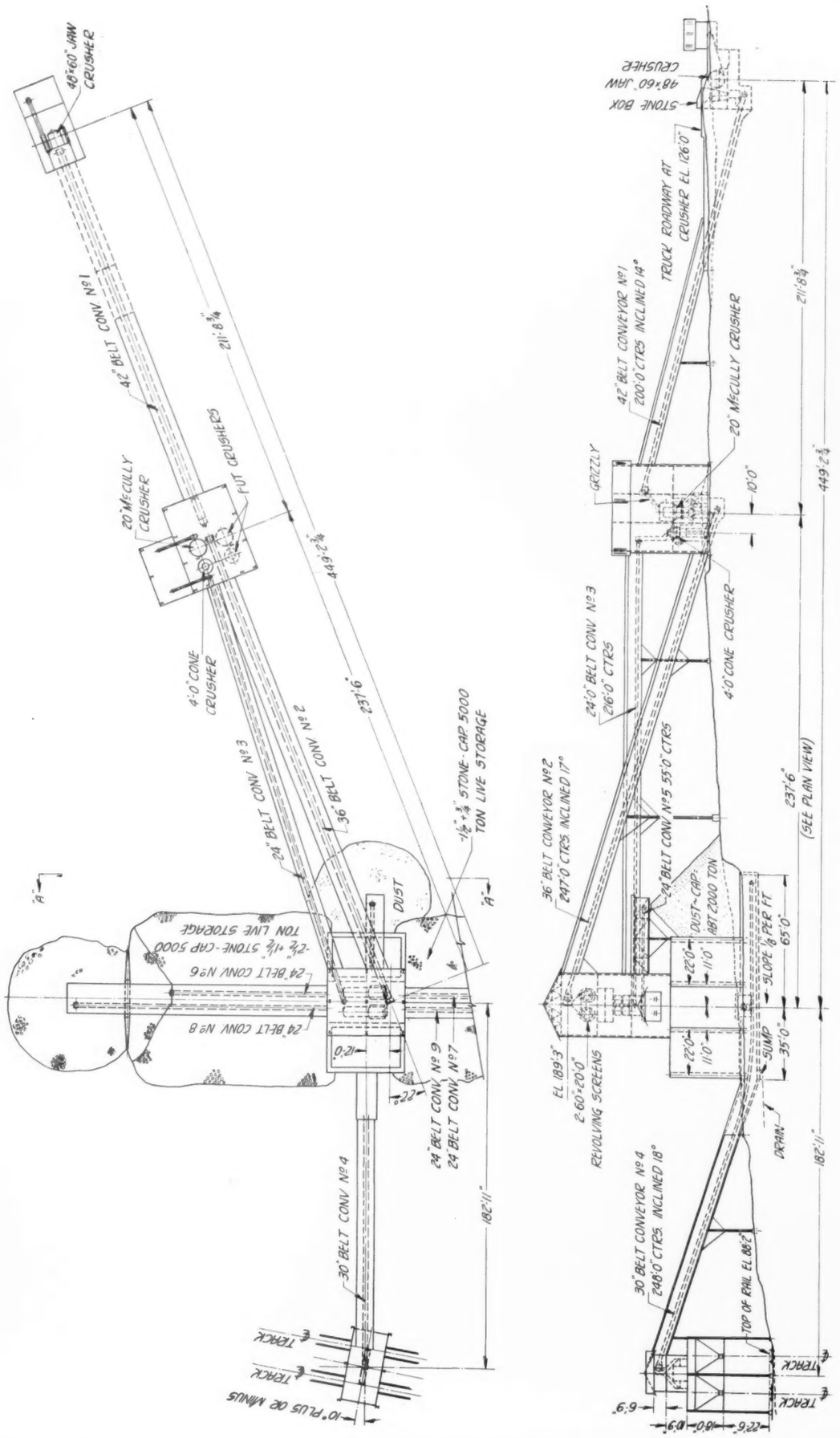
So far the quarry has been the bottle neck of the operation, but as the face is widened out, giving more room to work in, the production will become normal. The management is considering the use of well drills when they have developed a reasonably high face.

Excavation work necessary for the laying of foundations for the various plant units was started during the latter part of August, 1928, but the steel work was not undertaken until January, 1929, and the entire plant was ready to operate March 1st. There was a delay of several weeks in starting, as the trucks to be used for transporting the stone from quarry to plant were late in arriving.

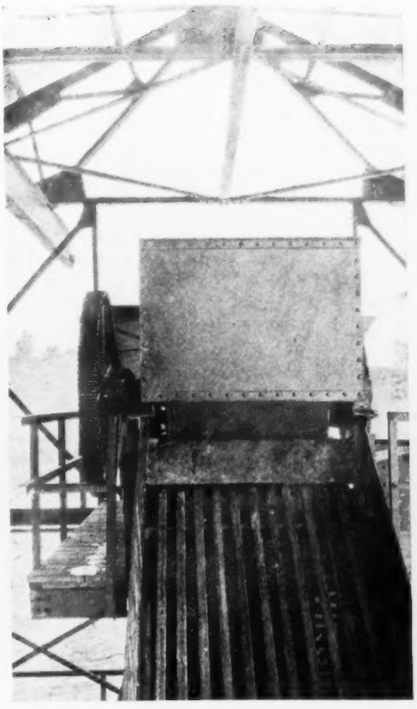
There are three 7½-ton Autocar trucks with 6-ton Easton side-dump bodies carrying stone from the quarry to the crusher. The quarry truck installation has proved quite satisfactory. With the present haul, which is about 400 ft., the three trucks can deliver under good loading conditions around 200 tons per hour to the crusher. The rock is loaded by a 3-yd. Bucyrus, 100-B electric, mounted on crawler treads.

The trucks on arriving at the crusher via a short ramp which sets flush with the ground, are side dumped by means of a Curtis air hoist to a 48-in. by 60-in. Allis-Chalmers jaw crusher equipped with corrugated jaws. A Cyclone chain hoist and a second Curtis air hoist are also at the primary crusher for repair and rock dislodgment purposes. Similarly a 10-ton Cyclone chain block mounted on an "I" beam trolley serves the secondary crusher and the Symons cone crusher as well, and an "I" beam and a 3-ton Cyclone hoist serve the scalper screens. This type of high speed chain hoist was supplied by Chisholm Mfg. Co. The crusher is driven by a 200-hp. Allis-Chalmers induction motor through an 18-in. rubber belt.

A very interesting feature of this crusher



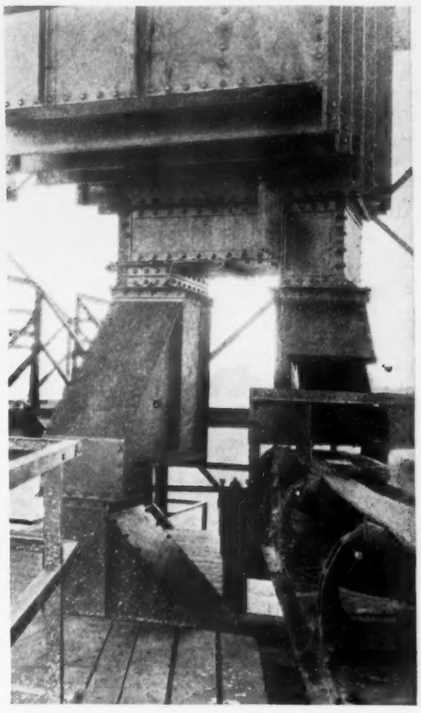
Elevation and plan of the Lithonia, Ga., operation, Consolidated Quarries Corp.



Bar grizzly placed ahead of the secondary crusher

drive is the use of reversing switches at the control switch panels. By means of this arrangement the crusher can be started at any time, even though the jaws are full of large stone, by simply rocking the movable jaws until sufficient momentum is secured to carry the load. This feature was worked out by the engineers of the company and installed at all its crusher units by J. M. Clayton Co., Atlanta, Ga., which likewise had the contract for all the electrical work.

The primary crusher is set to 6 in. and discharges to a 42-in., 10-ply rubber belt conveyor inclined at 14 deg. and 200 ft. on centers. This conveyor belt, as well as all the others in the plant, was supplied by the New York Belting and Packing Co. The conveyor carrier rolls are of the Stephens-Adamson, all steel, Timken bearing, 3-roller type, Alemite lubricated and spaced at 4-ft. centers with return rolls on 10-ft. centers. This primary conveyor is driven through open gear reduction by a 30-hp., 565 r.p.m. Allis-Chalmers induction motor, which drives the conveyor at 150 f.p.m. The head and tail pulleys of this conveyor are all 48 in. in dia. All the inclined conveyors are equipped with silent safety pawls. This belt discharges to a bar grizzly with 1¼ in. spacing, the oversize falling to a steel stone box which feeds a 20-in. Superior McCully



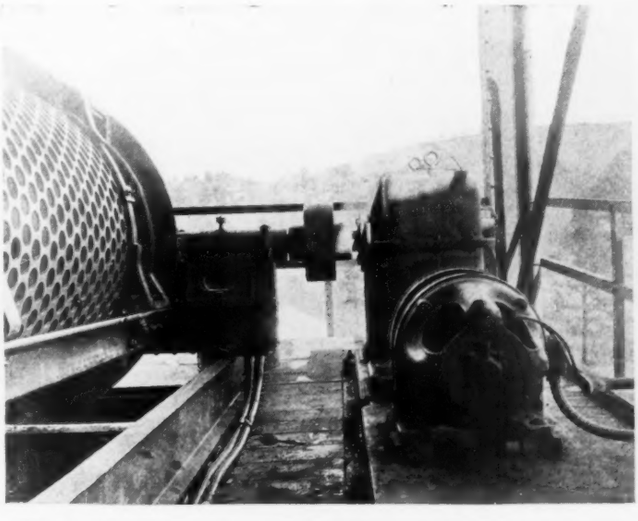
Conveyor (right) returns oversize to secondary crushers. The chutes at the left carry vibrating screen products

The 48-in. belt conveyor carrying material from the secondary crushers to the screening plant

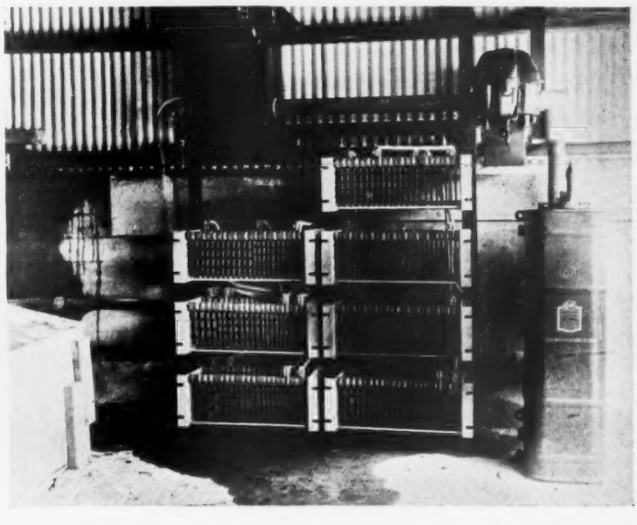
gyratory crusher. The McCully is driven by a 125-hp., 700-r.p.m., 550-v., 60-cycle, 3-phase Allis-Chalmers induction motor and a 16-in., 4-ply rubber belt. The crusher discharges to a 36-in. belt conveyor, 247 ft. on centers and inclined at 17 deg. to the horizontal. The troughs of the grizzly join the crusher and discharge at the foot of this conveyor by means of a steel chute. The conveyor is driven by a 30-hp., 865-r.p.m. Allis-Chalmers induction motor through open gear reduction driving the conveyor at 150 f.p.m.

Alongside of the 20-in. McCully is a 4-ft Symons cone which crushes the oversize from the scalpers, the cone crusher discharging to this same belt through a second steel chute.

The secondary crusher is set to discharge



The scalping screens are driven through electric motor and right-angle speed reducer



Reversing switch and controls permit starting of the primary jaw crusher under loaded condition

Screening plant and one of the stock pile building conveyors

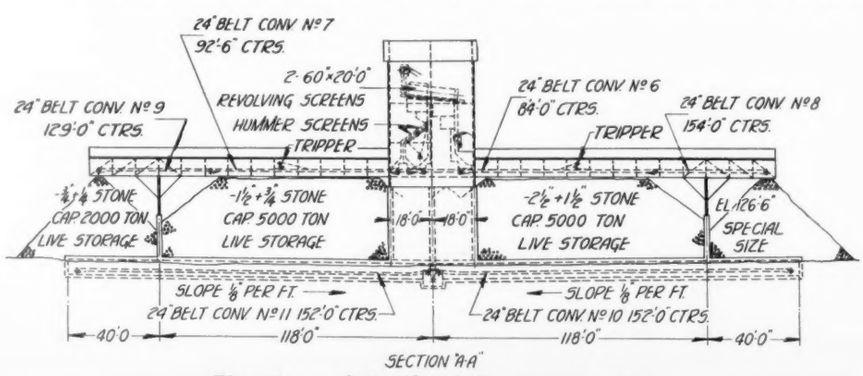
a 3-in. product, and the cone at about 1 in. on the closed side. They are very well pleased with the performance of the cone crusher as to its capacity, power requirements and reliable operation, but have not gathered sufficient as yet to give a statement as to the amount of fines produced. More will be said about this crusher later.

The material carried by this conveyor is split at its discharge and falls to two Allis-Chalmers 60-in. by 20-ft. scalping and sizing screens. These two rotary screens are identical and have an 8-ft. dust jacket with ⅞-in. round perforations. The first 10 ft. of the main barrel has 1¾-in. round perforations and the remaining 10 ft. are 2¾-in. The oversize falls to a 24-in. Stephens-Adamson belt conveyor, 216 ft. on centers, running horizontally. This conveyor delivers the rock at 200 f.p.m. to a vertical chute serving the Symons cone crusher. The scalper screens are each driven by 25-hp. Allis-Chalmers, 860-r.p.m., slip ring induction motors through right-angled Jones 21:1 worm gear reducers. The screens operate at 12.8 r.p.m. and are inclined at 1¼-in. per ft. of lineal length. The horizontal conveyor runs at 200 f.p.m. and is driven by a 5-hp., 850-r.p.m. induction motor through enclosed gear reductions. This motor, as well as all the other conveyor motors, was made by the Allis-Chalmers Manufacturing Co., and all are equipped with Timken bearings. The starter equipment for all the motors was made by Cutler-Hammer Co. The 4-ft. Symons cone crusher is driven by a 100-hp., 865-r.p.m. induction motor by a 12-in. rubber belt. Rockwood paper pulleys are used on all the motors using a belt drive.

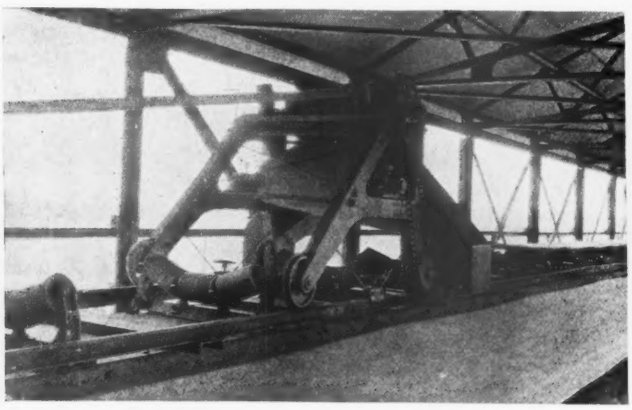
The fines from the dust jackets of the scalpers fall to four 4 ft., two-surface, 33 deg. type Hum-mer screens set two above two and all four equipped with ¼-in. by ¾-in. wire cloth with the long axis of the slots at right angles to the flow of material passing over the screen. At present it is the intention to make ¼-in. to ¾-in. and a minus ¼-in. (dust) material at the Hum-mers, using a single surface screen. Later a second surface will be installed on the Hum-mers so as to make a ¼-in. to ⅝-in. product, and a 24-in. belt conveyor is already provided for stock piling this sized product. This 24-in. belt conveyor (No. 9) is 129 ft. long and unloads at the end only, no tripper being provided. As the screen is now equipped with only one surface screen, the oversize (plus ¾-in.) falls to conveyor No. 8, which is 154 ft. long and 24-in. wide, and discharges at its end only, also. The minus ¼-in. material or dust falls to a short horizontal conveyor to ground storage between the concrete storage silos and the secondary crushing plant. The material is reclaimed by two gates which serve conveyor No. 4.

The motor generator set for the four Hum-mer screens is located near the feed end of the scalpers and is a W. S. Tyler & Co., 4-k.v.a., 2-k.w. generator direct-connected to a 5-hp., 850-r.p.m. induction motor.

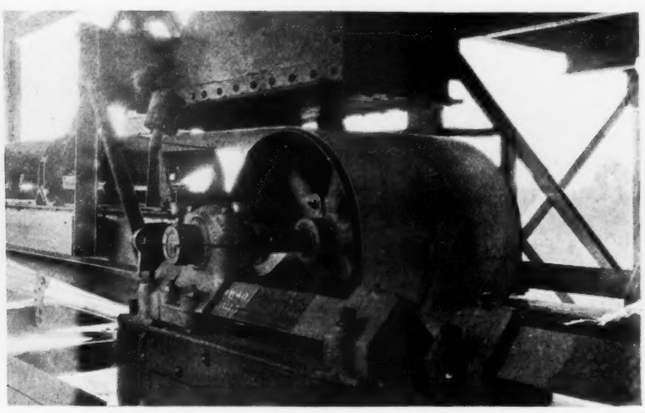
The oversize product from the dust jacket of this scalper (¾-in. to 1½-in.) falls through a steel chute to another 24-in. belt conveyor (No. 7) paralleling the longer conveyor that off-bears the ⅝-in. material, but is shorter, having a length of 92½ ft. This belt is unloaded by a Stephens-Adamson belt-propelled, hand-set tripper which discharges



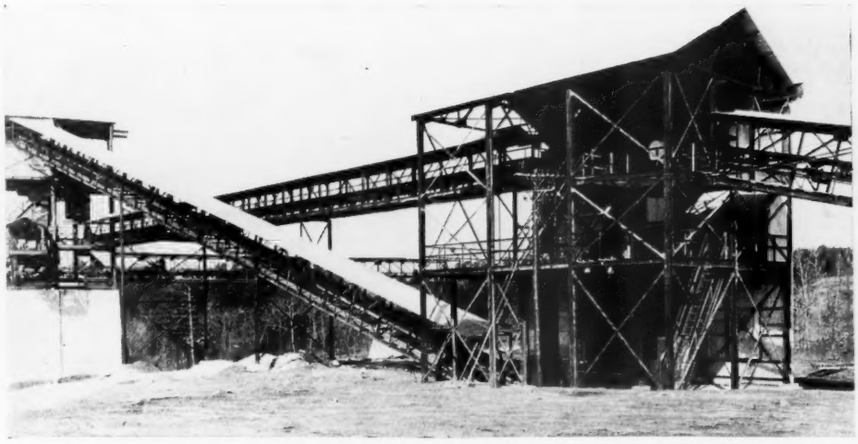
Elevation and details of the storage system



Tripping device on stock pile conveyor



Discharge end of chute serving one of the conveyors



Left—Secondary and finishing crushing plant and, right, primary crushing unit. The horizontal conveyor carries oversize from the scalping screens to the cone crushers

to ground storage below, building a pile alongside the minus ⅝-in. materials. The 1½-in. to 2½-in. stone from the end section of the scalper falls through a steel chute to a fourth (No. 6) stockpile building conveyor paralleling the conveyor handling the ¾-in. to 1¼-in. stone, and similar in detail to the No. 7 conveyor. It is 84 ft. long and unloaded by a stripper. Both conveyors are each driven by 5-hp., 850-r.p.m. induction motors through gear reduction at their head pulleys. These four belts operate in a steel horizontal gallery that passes under the structure supporting the Hum-mer and scalper screens, there being two parallel conveyors in the right wing and two in the left, and are 36 ft. above the top of reclaiming tunnel. The conveyors are all set on steel frames with board walkways, although the stairways are of steel provided with Irving steel treads. All the above conveyors, as well as all the 24-in. conveyors in the plant, are 8-ply rubber.

Car loading hoppers over the tracks

In addition to the open ground storage for four different sized products, there are two rectangular concrete storage bins, each holding about 470 cu. yd., which act as a base for the whole screening plant. One bin is used for ¾-in. to 1½-in. product and the second will be used for any odd size that the company should desire to produce later. These bins are each 18 ft. long, 22 ft. wide and 32 ft. deep. Production at present is restricted to four sizes: 2½-in. to 1½-in., 1½-in. to ¾-in., ¾-in. to ¼-in. and minus ¼-in., although later a ¼-in. to 10-mesh product will be made. It is possible by a few alterations in stock construction methods to produce and store nine different sizes of crushed stone. The total storage capacity will be 40,000 tons.

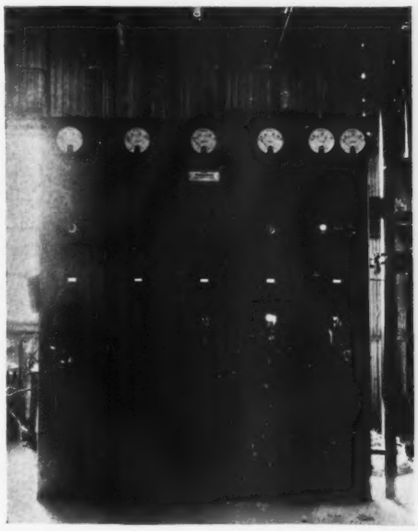
The plant is unusual for the granite region of the South, as it is a dry operation. This is made possible because of the total lack of overburden in the quarry that might contaminate the products and to the minimum of fines produced in the Symons cone crusher. Other granite crushing companies have found that this type of secondary crusher is quite suited to their work. On the basis of present operation, the plant will not be changed to the wet, for results are very satisfactory.

The material in the stock pile is reclaimed by two 24-in. belt conveyors located in a concrete tunnel built under the stock pile, the two belts (No. 10 and 11) delivering to a third 30-in. belt conveyor (No. 4) running at right angles to the two initial belts and delivering the rock to the third belt at a point near the center. Each of the two belts is fed by vertically operated rack and pinion gates located every 10 ft. along the length of the belt. The belts are 152 ft. long and each is driven by a 5-hp., 850-r.p.m. induction motor. The third belt, inclined at an angle of 18 deg., has a length of 248 ft., discharging to two steel hoppers holding 50 tons each which are constructed over the two loading tracks. Belt No. 4 is also fed by six rack and pinion gates as well as by the two main feeder belts, and is driven by a 30-hp., 865-r.p.m. induction motor.

The railroad track has storage capacity for 30 to 35 cars above the plant and the cars can be dropped to the loading hopper on either of two tracks making it possible to load two cars of different materials at the same time. To do this of course the conveyor supplying these two steel bins would have to handle each product separately at different times.

Power

Power is delivered to the plant by the Georgia Power Co. at 38,000 v. and stepped down to 550 v. by three 500-k.v.a. Westinghouse transformers. In the same room with the compressor is a 5-panel Westinghouse switchboard; panel No. 1 controls the compressor; No. 2, the crushers and 48-in. belt conveyors; No. 3, quarry shovel; No. 4, stock conveyors and screening plant, and No. 5, the lights.



Control board for various plant operations

Repair Shop

A well equipped shop for maintenance and repairs has been provided in which is housed an Ingersoll-Rand No. 50 "Leyner" drill sharpener, an oil-fired furnace, a 24-in. lathe, 20-in. shaper, 20-in. drill press, Power hack saw, Oxweld and electric welding outfits and a 10-in. electric driven emery wheel. All the equipment in the shop is driven by a 10-hp. motor from a line shaft running the length of the building, except the grinder, which is direct-connected to a ½-hp. motor.

Adjoining the shop is a small room housing the Ingersoll-Rand, class P.R.E.-2 compressor, driven by a 300-hp., synchronous motor, 254 amps., 550 v. This operates at 225 r.p.m., delivering air at 100-lb. pressure to a 4-ft. by 16-ft. vertical air receiver through a 6-in. line. A 4-in. line serves the

quarry. Excitation for the synchronous motor is by means of a 7½-k.w., type E-80, 125-v. 1150-r.p.m. generator belted to the synchronous motor by a 5-in. belt.

MOTOR SCHEDULE

	H.P.
Primary crusher	200
Secondary crusher	125
Finishing crusher	100
First 42-in. conveyor (No. 1)	30
Second 36-in. conveyor (No. 2)	30
Scalper No. 1	25
Scalper No. 2	25
Hum-mer screen generators	5
Oversize conveyor No. 3	5
Stock pile conveyor No. 6	5
Stock pile conveyor No. 7	5
Stock pile conveyor No. 8	5
Stock pile conveyor No. 9	5
Reclaiming belt No. 10	5
Reclaiming belt No. 11	5
Loading belt No. 4	30
Dust belt No. 5	5
Compressor	300
Shop	10
Total	920

Personnel

The main offices of the Consolidated Quarries Corp. are at Atlanta, Ga., with a sales office in the Bona Allen building, Atlanta, Ga. A. F. Hyde is president; A. G. Loomis, treasurer, and G. A. Austin is general manager. R. H. Cobb has charge of the Atlanta office. The operating personnel consists of Nelson Severinghaus, superintendent; R. P. Parrish, mill foreman; George Hicks, quarry foreman, and W. J. Johnson, master mechanic.

Phosphate Rock Industry of Tennessee

TENNESSEE is the second largest phosphate rock-producing state, ranking next to Florida, and has maintained this position since it passed South Carolina in 1899, says the United States Bureau of Mines, Department of Commerce, in a recently issued publication. The Tennessee phosphate deposits at present worked are in west-central Tennessee. Two types of rocks are now mined—"brown phosphate rock" and "blue phosphate rock." The brown phosphate rock is the residual weathered and leached outcrop of the phosphaltic Ordovician limestones, exposed over a wide area in the southern part of the central basin of Tennessee, where the erosion of that basin in the summit of the Nashville dome has exposed the underlying Ordovician phosphatic limestone. The so-called blue phosphate rock is a thin, unweathered highly phosphatic stratum of Devonian or Carconiferous (Mississippian) age occurring in the western part of the phosphate region.

Living quarters for the company employes. The staff homes are at the right

The overburden of the brown rock phosphate is clay and is removed, by the large companies, with drag-line excavators. Mining of the brown rock is by dragline excavators whenever possible. Where the phosphate is thin or lies in narrow channels ("cutters") in the limestone and cannot be mined by the drag-line excavators it is mined by pick and shovel. The use of steam shovels and hydraulic methods for stripping or mining is no longer practiced. An electric shovel is used in mining phosphatic filler near Nashville. The blue rock is mined by underground methods—drift mining by single-entry room-and-pillar system.

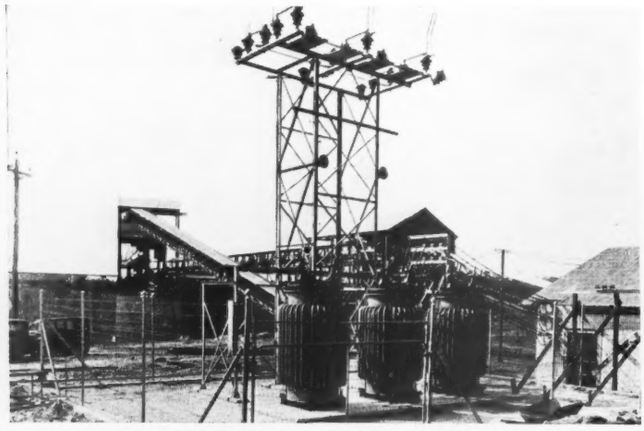
Most of the brown rock is washed. Lump phosphate rock suitable for furnace use is either removed in the course of hand-mining operations or is taken out by screens in the early stages by washing. The washing process consists mainly in first thoroughly agitating the phosphate-bearing material with water to disintegrate it, so that all the clay and fine sand are in suspension and separated from the coarse sand and lumps. Next follows removal of the coarser phosphatic material by screening and the separation of the finer phosphatic grains from clay in mechanical or hydraulic classifiers. The wet rock from the washers is allowed to drain off excess moisture in outdoor storage piles and is then dried further in coal-fired direct-heat rotary driers. The blue phosphate rock requires only crushing and drying before shipment.

Drilling and Blasting in Some American Metal Mines

THIS REPORT presented under the above title by Theodore Marvin at the 1928 meeting of the A. I. M. E. has been published in book form by *The Explosives Engineer,* Wilmington, Del. It is an excellent aid to operators who wish to study excavation methods used in mines of this and nearby countries. The data were supplied by various members of the mining profession at the request of Mr. Marvin.

The compilation comprises three sections: first, general and specific tabular material; second, drilling and blasting diagrams showing hole positions, order of detonation, and charges; and third; a series of brief indexes.

The tables include data which are pertinent to a study of a mine's drilling and blasting methods. Geographic location, type of mineral and mine entrance are valuable aids in comparing methods as also are the descriptions of orebody type, and dip and strike. The practices of an open pit copper mine and an underground limestone mine were added to show similarity of blasting methods.



Outdoor transforming station

Compressor building and repair shop

Rock Products Activities in the Omaha, Nebraska, Territory

Aggregate Producers Have Solved the Problem of Disposing of Small Sized Products

By W. B. Lenhart
Associate Editor, Rock Products

WITHIN a 40-mile radius of Omaha, Neb., is a producing area that supplies most of eastern Nebraska and southwestern Iowa with their requirements of sand, gravel, crushed stone, etc. There are no commercial deposits in or immediately contiguous to that city, nor are there any of importance in southwestern Iowa that are capable of producing cheaply good aggregates. Consequently, in the producing district there are a surprisingly large number of operations, considering the population of the producing areas, and no doubt if it were not for the shipments that are made over comparatively long distances, there would be no justification for the existence of so many plants.

One of the Lyman-Richey Sand and Gravel Co. operations near Fremont

One company, the Lyman-Richey Sand and Gravel Co., has a total of 23 plants in Nebraska, Iowa and Kansas. Twenty of these operations are in western Nebraska. The Schellberg Sand and Gravel Co. has two plants; the Allis Sand and Gravel Co. has two, and the National Stone Co. has two crushed stone plants in the district. So, considering the markets, the eastern Nebraska producers are in a similar position to many of their eastern brethren in some other localities—a serious overproduction, with severe price cutting. As one producer puts it, "There are some mighty vicious people in the sand and gravel business."

Nebraska increased the gasoline tax from 2 to 3 cents early in 1929 and expects to realize $6,000,000 in 1929 as a result of this tax. The new law provides that one-half, together with federal aid, shall be used for pavement construction, and the Department of Public Works expects to be able to build 100 miles of hard-surface roads yearly. This amount of money will be increased, naturally, by the increased use of the additional highways. In addition to the gas tax, the state levies a rather heavy automobile license tax. Nebraska has no outstanding bond issues for highway construction.

In Iowa there will be 750 miles of pavement under construction this year, the work being scattered pretty uniformly all over the state, so that the southwest portion, served by the eastern Nebraska producers, will no doubt secure its share of this aggregate business.

Iowa voted a bond issue of $100,000,000 in 1928, but the state supreme court decided that the law authorizing the issue was unconstitutional. To get around this difficulty each of the 99 counties in the state is passing a bond issue of 4½% of its assessed valuation, the money to be spent under the direction of the state highway commission; and each county expects eventually to have these bonds refunded from money secured from the state 3-cent gasoline tax. During 1928 it was estimated that 1/29th of all highway money expended in Iowa was for gravel-top or crushed-stone roads and 17/29ths for concrete pavements. There are no asphalt or "black-top" roads in the state.

End view of a typical sand and gravel plant in the district

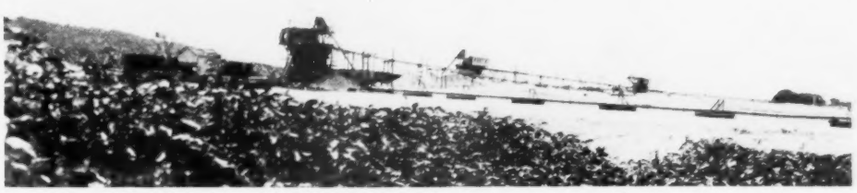
Early in June, 1929, the citizens of Council Bluffs and Pottawattamie county by a unanimous vote carried a bond issue, having learned their lesson as to the cost of the "mud tax."

Great Shortage of Gravel

When they speak of "sand-gravel" in the Omaha territory they refer to a product that resembles coarse concrete sand and has the following screen analysis:

	Per cent
Plus 40-mesh	90-92
Plus 10-mesh	48-55

Very seldom will there be any ½-in. to 1½-in. materials, and anything coarser than 1½-in. is not present at all, one reason being that there is no gravel of



Three of the Lyman-Richey company plants near Fremont

that size and the other being that if there would were it would be rejected as oversize, as the primary screens function in that manner.

A mere screen analysis does not convey to the average reader what the material is but for those it is best pictured as a coarse sand with an occasional piece of gravel the size of a marble. This material (sand-gravel) is both the coarse and fine aggregate used throughout the district.

Years ago the Lyman-Richey Sand and Gravel Co. realized that this class of material was the only one available, so it set to work to see what could be done about it, and for years the company conducted an elaborate amount of testing, field work, etc., and not only convinced itself as to some of the previously held fallacies of fine aggregates, but converted the engineers of the highway departments of both states, local contractors, etc., who now insist on material of this class.

The results of these tests were compiled in a neat loose-leaf booklet and are available to contractors in the markets served.

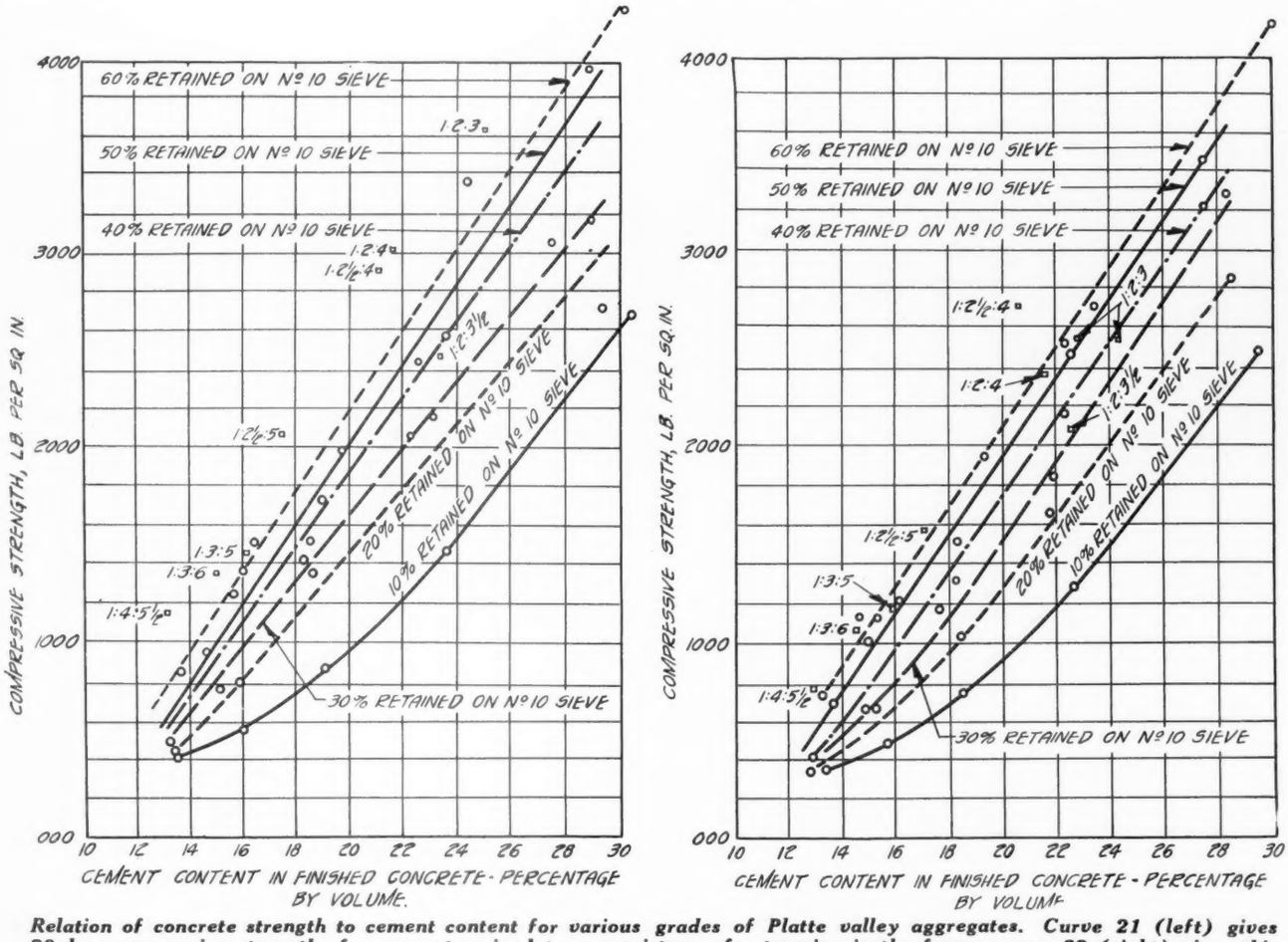
As a sample of the work undertaken, the following was taken from this booklet and shows the physical strengths obtained with these aggregates and, what is more important, the economies of its use in the district:

ECONOMY OF SAND-GRAVEL

Curve 21 was plotted from data obtained from the compressive strength of samples mixed to a consistency such that it was necessary to tamp the concrete in the forms, while the results plotted on Curve 22 were obtained from samples mixed to the consistency ordinarily used in concrete pavement construction. A study of Curve 21 shows that the compressive strength of the broken stone-sand concrete cylinders averaged approximately 300 lb. per sq. in. more than the samples made with the sand-gravel aggregate, with a like amount of cement in the finished concrete and mixed to the same consistency.

Curve 22, however, represents the results of tests made on concrete mixed to the consistency ordinarily used in pavement construction. A study of this curve shows that the average strength of concrete made of a combination of broken-stone and sand is the same as the strength of concrete made with an aggregate of Platte Valley sand-gravel. Of the mixtures plotted, 25% have a strength between that of a Platte Valley sand-gravel with 50% retained on a No. 10 sieve and that with 60% retained on the same sieve, in other words sand-gravel, 25% have a strength less than that for sand-gravel, 37.5% have a strength of approximately 50 lb. per sq. in. more than that for sand-gravel. In other words, in only 12.5% of the tests does the broken-stone-sand combination show itself superior as a concrete aggregate.

This being the case, the economy in using sand-gravel as a concrete aggregate for pavement construction is self-evident, since the same strength may be obtained with the same percentage of cement per unit volume of concrete as would be obtained if an aggregate of broken stone and sand were used, and there is actually less weight of aggregate per cubic unit of concrete in the case of the sand-gravel aggregate, as has been shown in "A Discussion of the Concrete Yield for Various Combinations of Nebraska Sands and Gravels."



Relation of concrete strength to cement content for various grades of Platte valley aggregates. Curve 21 (left) gives 28-day compressive strengths for concrete mixed to a consistency for tamping in the forms; curve 22 (right) gives this data for consistencies ordinarily used in concrete pavement construction

A study of Curve 22 is also illuminating in bringing out the comparative value of sand-gravel and pit-run sand as a concrete aggregate. For example, if it is the intention to produce a concrete of a strength of 2000 lb. per sq. in., it is necessary to have 24% of cement, by volume, in the finished concrete, while only approximately 20% of cement, by volume, is necessary where sand-gravel is used. Thus there is a saving of 16⅔% of cement. Or, from another point of view, if it is decided that a mixture containing 22% of cement in the finished concrete is wanted, a concrete of a strength of approximately 2400 lb. per sq. in. in 28 days will be produced if sand-gravel is used, while pit-run sand will produce a concrete of a strength of only a little over 1600 lb. per sq. in.

Omaha is a distributing point for a large

section of country to the west, a district in which lumber is expensive; consequently, brick and concrete construction are used to a great extent. In traveling westward from Omaha and through Wyoming, hardly a building or home is seen that does not have some portion of it constructed of concrete tile or precast concrete in some form or other. Omaha has a large concrete tile industry that serves this western area.

As is usually the case in the western states, car shipments to the smaller dealers are made up of a wide variety of various building materials, and several of the concrete tile manufacturers in Omaha carry quite a stock of lime, gypsum and other building materials so as to deliver to the western users in mixed carload lots.

Excess material from the washing plant is returned to an abandoned pit by steel launders

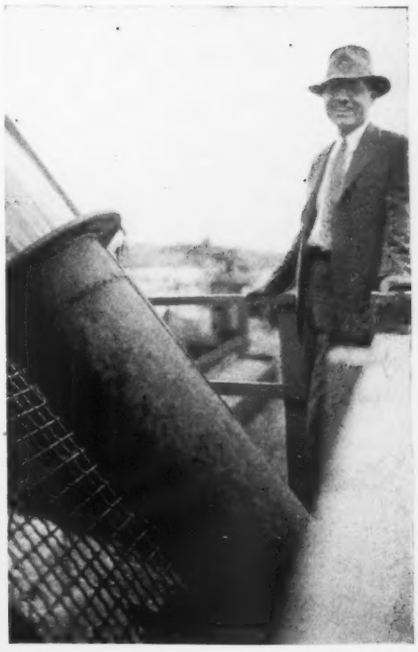
Cement and Gypsum

At Louisville, Neb., the Ash Grove Lime and Portland Cement Co. has recently placed in operation a new portland cement plant that will serve that territory; and to the west, at Laramie, Wyo., the Monolith Portland Midwest Co. also recently started its new plant and is shipping into western Nebraska. The Monolith company is intending to ship into Omaha its "Plastic Waterproof Portland Cement," which is a specially treated portland cement. This company is just beginning to advertise its product in the Omaha territory. It is said that the plastic cement can be shipped into Iowa and Illinois territories.

Gypsum building materials are shipped into Nebraska from all four surrounding states, but most of the smaller towns get their requirements from the two mills operating at Laramie, Wyo. One mill is owned by the United States Gypsum Co. and the other by the Certain-teed Products Corp., and both use gypsite as a raw material. There are four gypsite mills at Laramie, but only two are operating.

The gypsite will run 85% to 88% gypsum and when calcined will carry 15 or 16 shovels of sand per sack. It has the remarkable quality of not aging—sacks stored for 20 months, on testing, hold their sand-carrying capacity and good spreading qualities. For this reason gypsite plasters are preferred by the smaller dealers.

Sand and gravel flowing over another steep-inclined gravity screen where the final separation is made



The dredge discharges to a steep-inclined gravity screen. Fred P. Curtis of the Lyman-Richey company is standing by such a screen, which is typical of district practice

The manufacture of gypsite plaster is very simple. The deposit is plowed or harrowed and allowed to dry as much as possible, after which the gypsite is hauled by a "Fresno" type scraper to a car-loading bridge. The cars are delivered to the mill and the contents, after screening, are calcined. The stucco is retarded, if necessary, and sacked for shipment. No grinding is necessary, either before or after calcining. The fineness compares favorably with any of the more familiar brands of rock gypsum plasters.

The deposits are very close to the ground water level and consequently the material contains from 20% to 50% free moisture. The greatest problem is one of economical drying; otherwise, costs are extremely low,

The new cement mill of the Ash Grove Lime and Cement Co., on the Platte river, Louisville, Neb.

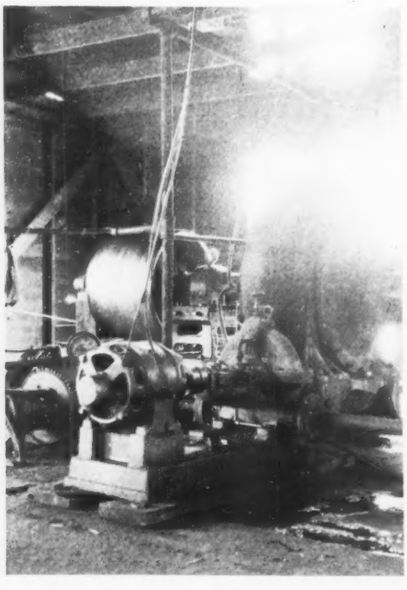
permitting shipments over a wide area.

Railway Ballast

Between Laramie and Cheyenne, Wyo., the Union Pacific system operates a large ballast pit, securing its materials by simply loading the bank-run material with steam shovels to gondolas. The ballast appears to be a decomposed granite or porphyry laid down in a blank formation that covers the district for miles. No washing, screening or sizing of any kind is done. The ballast

Dredge and pontoon lines at the Schellberg Sand and Gravel Co. The dragline stripping the deposit shows at the upper right

A steam dragline with 2-yd. bucket is used to strip the Louisville, Neb., deposit of the Schellberg Sand and Gravel Co.



One of the 8-in. suction pumps used on a Lyman-Richey dredge

is very uniform in size and practically all will pass a 1½-in ring, but the majority of the particles are ¾-in. or finer, judging from the general appearance. At Buford, Wyo., the location referred to, a pit covering several square miles has been in operation for years. The bank of decomposed material will run from 10 to 30 ft. high, with practically no overburden. None of the producers of commercial sand and gravel have any ballast business.

Sand and Gravel Production

All of the sand and gravel producers in the Omaha territory follow much the same procedure in production methods, using 8-in. to 10-in. pumps, mounted on suitable pontoons, which deliver the sand-gravel to a 1½-in. gravity screen. This screen is placed at a steep inclination, the small amount of oversize being rejected.

After passing this stationary screen, the thin pulp is spread out over a flat surface, slightly inclined, which delivers the sand-gravel to a second steeply inclined, stationary screen for final separation. At the Lyman-Richey plant near Fremont, Neb., that company recently placed in operation an all-steel, movable plant of this type, and at that plant the second screen is 4 ft. by 20 ft. and uses a 5- to 7-mesh wire screen, depending on the products wanted. This screen is placed on edge and a rubber blanket is hung over part of the face of the screen, and by raising or lowering this blanket the amount of fines retained by the sand-gravel can be regulated. The sand-gravel that flows over the spreader ahead of this screen impinges against this rubber, which serves as a wearing surface. Wood was used previous to installing the rubber blanket, but the former lasted only a few months, while the rubber lasts for years.

The oversize from this screen falls to bins holding one carload, and is shipped for sand-gravel. The fines pass to simple hopper-bottom settling boxes for production of the finer sand. The excess material is returned to an abandoned pit via a steel launder. Here, again, are economies that are interesting—one steel launder at an older plant has been in this use for nine years and is still in first-class condition, whereas wood launders had to be replaced every year. The new all-steel plant of the Lyman-Richey company was built by the Fremont Foundry and Machine Co., Fremont, Neb.

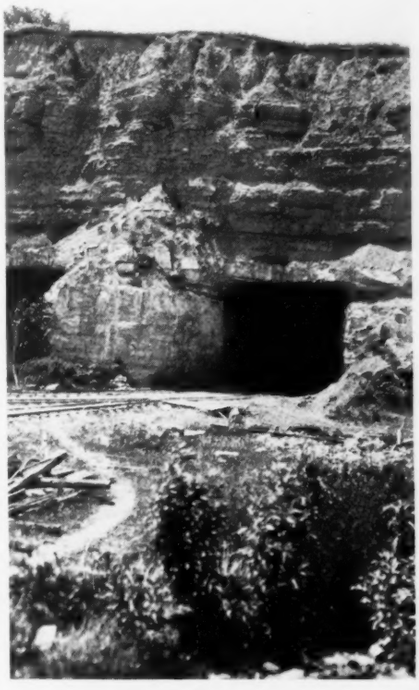
At the deposit serving this plant some stripping is done by a Monighan "walking" dragline. The deposit has a thickness varying from 20 to 60 ft.

Washing and screening plant of the Schellberg Sand ad Gravel Co., Louisville, Neb.

One of the problems of the dredge operators in this district is the protection of the pump lines from the high winds that frequently strike the district, and extra guy lines for wind anchorage are necessary.

The Lyman-Richey Sand and Gravel Co. and others as well have turned their abandoned sand pits, which are usually liabilities as well as eyesores, into an asset. These old pits soon become fringed with growths of trees and shrubs and make very attractive little lakes. The state has been buying these old pits and stocking them with bass, which has proved a boon to the fishermen of Nebraska, as lakes in that section other than this kind are unknown.

One of the attractive lakes made from an abandoned sand pit



Entrance of the No. 2 mine operated by the National Stone Co.

The extent of the Lyman-Richey Sand and Gravel Co.'s operations are as below:

Fremont, Neb.	4 plants
Columbus, Neb.	2 plants
Central City, Neb.	2 plants
Grand Island, Neb.	4 plants
Kearny, Neb.	2 plants
Fairbury, Neb.	2 plants
Atkinson, Neb.	1 plant
Norway, Neb.	1 plant
Pauline, Neb.	1 plant
Hays, Kan.	1 plant
Schuyler, Neb.	1 plant
Bloomfield, Neb.	1 plant
Plants idle	1
Total	23 plants

All of the plants are operated under district superintendents, with Elmer Sundrom at Louisville, Neb.; Nels Swanson, Fremont Valley; J. W. Curtis, Columbus; A. P. Jones, Grand Island, and R. M. Weblemoe at Fairbury, Neb. Mr. Weblemoe also operates a plant of his own near Fairbury, Neb.

H. F. Curtis is president of the Lyman-Richey Sand and Gravel Co.; L. C. Curtis, vice-president and general manager; Fred P. Curtis, secretary and purchasing agent, and E. H. Palmquist is treasurer.

Other Operators in the District

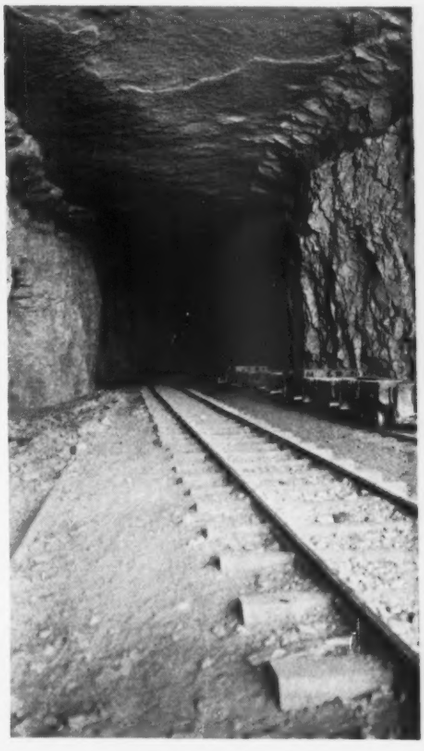
The Schellberg Sand and Gravel Co. operates a plant across the Platte river from one of the Lyman-Richey plants at Louisville, Neb., and one at Fremont, Neb. At the former plant the company has installed a new 8-in. pump dredge driven by a Buda M. A. N. diesel engine, which is one of the few installations of its kind. The pump at Fremont is a 10-in. electrically-driven. Some stripping is done at the former plant, using a 2-yd. Bucyrus Class 14 steam dragline.

George Schellberg is president and manager, and H. J. Tell is vice-president. The offices are in the Union State Bank Bldg., Omaha, Neb.

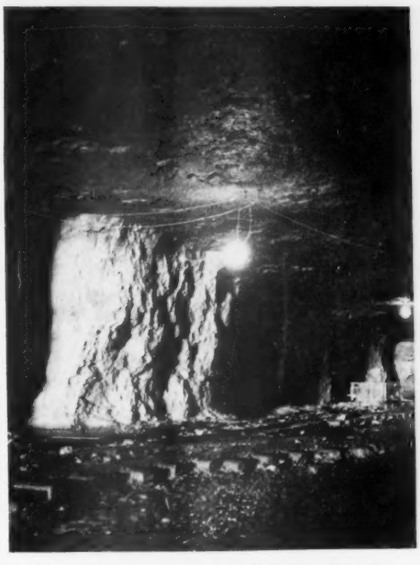
The All-Is Sand and Gravel Co. operates two plants at Allis, Neb., producing about 150,000 tons annually. Clyde W. Drew is president and W. A. Case manager.

The National Stone Co. has three mines south of Omaha, two being near Louisville. The operation designated as No. 2 was the only one visited, and this plant secures its stone from a tunnel driven into the horizontal beds of limestone that overlook the Platte river.

The mine is operated on the room and pillar system of mining, the pillars being approximately 25 ft. in diameter, with the rooms 30 ft. by 30 ft. The roof is about 25 ft. high and flat. The mine at present covers an area of approximately 1000 ft. by 1000 ft. and the extreme from a single adit.



Interior of the No. 2 mine



One of the rooms in the No. 2 mine

About 500 tons per day are taken from the mine at present, the lower 8 ft. of the ledge being shipped to the Ash Grove Lime and Portland Cement Co.'s new plant for cement manufacturing purposes, and the upper and, incidentally, softer rock goes mostly for commercial stone. Just why the softer rock is preferred is not clear.

The plant consists of a gyratory crusher, bucket elevator and a rotary screen, the various sizes of stone falling direct to cars.

The ownership of the National Stone Co. interlocks with that of the Ash Grove Lime and Portland Cement Co. Thomas Sullivan is vice-president and sales manager. F. H. Brammer is superintendent.

The Relation of Quality to Cost of Production of Portland Cement

By Eduardo Taylor
Chief Chemist, Cebu Portland Cement Co., Naga, Cebu, P. I.

THE COST OF PRODUCTION of a manufactured product generally increases with an improvement in its quality. This is due, in most cases, to a more careful and refined process of manufacture resulting in a decreased output, or in other cases to the use of better and costlier raw materials. There are, of course, some cases in which higher qualities are obtained by the use of better equipment and machinery without any increase in the cost of production. In some instances, in fact, better equipment may not only increase the quality but also increase the output resulting in a lower cost of production.

Improving the Quality of Cement

In the manufacture of portland cement there are some interesting relationships between the quality of the manufactured cement and its cost of production. The quality of a portland cement may be increased by any or all of the following operations:

1. Grinding the raw materials to a greater fineness.
2. Increasing the percentage of lime towards a higher tricalcium silicate content.
3. Burning with more intensity or duration.
4. Grinding the clinker more finely.

From results of actual plant work the writer found that the quality of the cement manufactured could be increased to a certain extent without affecting the cost of production. The limit to which the quality could be raised was a little short of the quality of high-early-strength portland cement. The increase, however, was very gratifying; in terms of the tensile strength of 1:3 standard mortar the increase in quality was as follows:

Age	Before raising quality	After raising quality
3 days	No tests	260
7 days	246	357
28 days	390	462

Of the four operations for increasing the quality enumerated above, only the first and second were employed.

An attempt to explain the causes of the satisfying results obtained in which the quality was considerably improved without increasing the cost of production will here be made.

The first operation of grinding the raw materials to a greater fineness increases the cost of the raw grinding process because such increased fineness can only be obtained, with the same equipment and materials, by decreasing the amount of feed to the raw mills, resulting in a lower production of slurry or raw meal. The increase in cost, however, will be small, due to a smaller consumption of raw materials, the cost of which generally constitutes the largest item in the raw grinding expenses. To illustrate, suppose 1600 bbl. of slurry can be ground per day by a mill at a fineness of 80% through a 200-mesh sieve, and suppose the total cost of the raw grinding operation for a period of one month is as follows (for obvious reasons, all the cost figures given in this article are fictitious):

Item—	Cost
Raw materials: 14,400 tons @ $0.34	$4,896.00
Operating labor	1,710.20
Repair labor	128.76
Operating supplies	692.34
Repair supplies	118.96
Power	876.37
Total cost of slurry (48,000 bbl.)	$8,422.63
Cost per bbl.	0.175

If the fineness of the slurry is increased to 95% through the 200-mesh sieve the output of slurry is reduced, let us say, to 1300 bbl. per day. Then the cost with the same conditions will be as follows:

Item—	Cost
Raw materials: 11,700 tons @ $0.34	$3,978.00
Operating labor	1,710.20
Repair labor	128.76
Operating supplies	692.34
Repair supplies	118.96
Power	876.37
Total cost of slurry (39,000 bbl.)	$7,504.63
Cost per bbl.	0.192

In this particular case, therefore, the cost of slurry is increased from $0.175 to $0.192, due to improving the quality of the slurry by finer grinding.

In some cases it may be possible to raise the fineness of the slurry by increasing the charge of grinding media in the mills without appreciably affecting the production and cost.

Clinker Burning

If the quality of the cement is raised by increasing the fineness of the raw mix and the percentage of lime, it is possible to do so without affecting the cost of the clinker. While it is true that a higher-limed mix is more refractory and harder to burn, it is also true that the greater fineness makes the material easier to burn. If a balance therefore can be obtained between these two factors so that the higher refractoriness of the higher-limed mix is compensated for or relieved by the increased fineness there should be no adverse effect on the production, fuel consumption and cost of the clinker. In plants that are troubled with "fire rings," it may even be possible to increase the output and reduce costs because a remedy for "fire rings" is a higher-limed mix. Such was the case experienced by the writer in which the results were as follows, the increased output being due to the total absence of the troublesome "fire rings" because of the higher lime content carried:

Per cent CaO in clinker	Tensile strength 1:3		Bbl. per hour clinker
	7 days	28 days	
64.5	246	390	44.3
66.5	357	462	48.0

To illustrate this point let us take the following two cases, Case I showing the results and costs before improving the quality, and Case II after the slurry fineness and lime content are increased. It is assumed that the fuel used is the same in quantity in both cases, as a lower coal rate is to be expected in Case II.

	Case I	Case II
Fineness of slurry (200-m.)	80%	95%
Lime ratio	1.90	2.05
Tensile strength 1:3		
7 days	246	357
28 days	390	462
Production bbl. per hour	44.3	48.0
Production bbl. per month	31896.	34560.

MONTHLY COSTS

Raw materials and slurry grinding	Case I	Case II
Case I $0.175 / Case II .192	$5,581.80	$6,635.52
Operating labor	912.18	912.18
Repair labor	81.20	81.20
Operating supplies	96.51	96.51
Repair supplies	116.44	116.44
Fuel (prepared)	10,679.80	10,679.80
Power	2,100.53	2,100.53
Total cost	$19,568.46	$20,622.18
Cost per bbl. clinker	0.614	0.597

Clinker Grinding

It is the writer's experience that high-limed clinker is easier to grind than low-limed clinker. While no detailed study of this matter was undertaken, the results confirming this fact were readily apparent. This confirms Meade's statements to this

effect as well as Gano's tests on the subject.* In the writer's opinion, the reasons for the better grindability of high-limed clinker are the following:

1. The material, being more refractory, does not sinter in the kiln so strongly as low-limed clinker.

2. High-limed clinker, being lower in alumina, is smaller in size and requires less grinding in the first compartment of a combination tube mill, or in the preliminary grinder of a two-stage grinding process.

Granting, therefore, that high-limed clinker is easier to grind, an increase in the quality of clinker will have a beneficial effect on the cost of the grinding process, provided the fineness of the cement is maintained at the same figure. If, however, it is desired to increase the fineness, this can be done without affecting the cost by increasing the fineness to such an extent only that the output is not reduced; that is, a balance obtained between the increased fineness and the softer character of the clinker. The writer found that in one particular case the possible increase in fineness amounted to 4 to 6%. It is possible, therefore, to increase the fineness of the cement without reducing the output when higher-limed clinker is ground.

To complete this discussion and to arrive at the final costs, let us assume that it is found in a particular case that the same output can be maintained and the fineness increased from 81% to 85% (200-mesh) by grinding a higher-limed clinker. The cost of grinding will then be the same. Assuming this to be $0.240 per barrel (including gypsum) the total cost of ordinary cement and high-quality cement would be respectively as follows:

	Ordinary quality	High quality
Cost of clinker per barrel	$0.614	$0.597
Cost of finish grinding	0.240	0.240
Total cost	$0.854	$0.837

This total cost does not represent the total bin cost, as there are other items such as mill overhead, taxes, depreciation, machine shop, etc., that make up the bin cost. This is sufficient, however, to illustrate the subject in point, as the other items are more or less constant figures not affected by quality or quantity of production.

Summary

The quality of an ordinary portland cement may be improved without affecting the volume or cost of production.

Finer grinding of the raw mix increases the cost only slightly because the decreased slurry output is accompanied by a smaller consumption of raw materials, which is the main item in the cost of slurry.

The cost of clinker will be the same or lower because:

1. The increased refractoriness of a higher-limed mix will be offset by the greater fineness of the material.

2. The formation of troublesome "fire rings" will be avoided in most cases by the higher lime content, thus making possible a more continued and uninterrupted operation of the kiln.

The cost of the ground cement will be the same or lower because high-limed clinker is easier to grind. This fact can be taken advantage of to increase the output of a finish mill or to increase the fineness with the same output.

A set of illustrative cost figures are presented.

It is admitted that a part of the statements and examples given herein are theoretical. While the writer does not attempt to generalize the conclusion, it is believed that in many cases the results will be as explained and careful trials wil be worth while.

This discussion does not include the new high-early-strength portland cements, which, owing to extreme refinement in manufacture and composition, naturally have a higher cost of production.

*R. K. Meade, "Portland Cement," 3rd edition, p. 378.

Relation Between Temperature and Expansion of Setting Plaster

A PAPER presented by F. J. Williams and F. C. Westendick at the February 1, 1929, meeting of the American Ceramic Society, Chicago, Ill., gave the results of investigations to determine the relation between the expansion curve and the temperature curve in the setting of gypsum plaster.

The setting of plaster results from first, the dissolving of the stucco which unites with the water and reprecipitates as the dihydrate. The first change is a contraction due to the dissolving of the stucco and this is followed by expansion. Equilibrium is reached when the solution is saturated and the double hydrate crystallizes out, causing expansion.

The heat evolved is primarily a heat of solution of the hemihydrate, the crystallization absorbing some of the heat produced. While the expansion curve is dropping, the temperature curve is rising. The temperature curve reaches its maximum when the hemihydrate is all in solution.

Methods of testing, apparatus, data and calculations are given.

Lubrication of Cement Mill Machinery

LUBRICATION of cement mill equipment must be carefully studied for it will be the ultimate criterion in determination of power costs and production efficiency, says a recent article in *Lubrication*, published by the Texas Co., New York. The article gives in detail and illustration the various types of cement mill equipment, and specifies the proper lubricant.

Calcium Sulphate Retarders for Portland Cement Clinker

AN investigation of the use of calcium sulphate for retarding the set of portland cement clinker has been conducted by the United States Bureau of Mines, Department of Commerce. A definite control of the time of set of portland cement is one of the problems which has been of primary interest to this important industry. The main purpose of the investigation was to develop a wider field of utilization for natural anhydrite.

In September, 1925, the Bureau of Mines published Serial 2705 (abstracted in Rock Products, October 31, 1925), giving the results of an extensive series of tests on the retarder problem. This report indicates that mixtures of plaster of paris and anhydrite will generally retard the set of portland cement clinker, but that straight anhydrite is of questionable value. Twenty different samples of clinker were tested, but only one anhydrite was used in this first series of tests.

The question arose as to whether or not the results obtained with one sample of anhydrite would be greatly applicable to mill conditions, and A. S. T. M. committee C-11 asked the Nonmetallic Mineral Experiment Station of the bureau to extend its research to determine whether the type of anhydrite or its degree of fineness would affect its action as a retarder for portland cement.

Following this request, the Bureau of Mines undertook a series of tests with three additional samples of natural anhydrite and one of by-product material, the results of which tests were published in abstract in Rock Products, December 8, 1928, and recently in detail as Bureau of Mines Technical Paper No. 451 by Ernest E. Berger, which may be obtained from the superintendent of documents, Government Printing Office, Washington, D. C., at a price of 10 cents.

The relation between the action of the different forms and mixtures of calcium sulphate noted in this main series of tests is similar to that noted in the former investigation conducted by the Bureau of Mines in which 20 samples of cement clinker were tested.

Graphite

THE BUREAU of Mines Circular No. 6122, Part II by Paul M. Tyler contains brief descriptions of the domestic graphite deposits as well as the more important foreign deposits. Production methods, tonnages, exports, imports, prices, etc., are also briefly referred to. Circular No. 6123 (Part III) contains a summary of the various uses of graphite with consumption figures for the various industries. Graphite substitutes are also briefly discussed.

This series of bulletins includes No. 6124 (Part IV) which gives a discussion of the status of the American graphite industry.

The Patent History of Lime

By Joseph Rossman
Washington, D. C.

THE PRINCIPLE of making lime consists in merely heating the carbonate of lime so as to convert it to the oxide by driving off the combined carbon dioxide as follows: $CaCO_3 = CaO + CO_2$. Lime can be made by the intermittent or by the continuous process.

Early Methods

The most primitive lime kiln is made by forming a cavity in the side of a hill and filling it with lumps of limestone. Wood is burned at the bottom until the temperature is raised to a red heat. This temperature is maintained for about two days. The kiln is then cooled and the lime withdrawn. This is a very crude and inefficient process due to the great loss of heat and fuel.

Another method consists in supplying alternate layers of limestone and fuel to a kiln. A wood fire is started at the bottom and the heat maintained for a few days until the limestone is converted to lime. In this process the resultant lime is mixed with a great deal of ash and fuel. This process can be carried out in a continuous kiln, the limestone and fuel being fed at the top and the lime being withdrawn at the bottom.

Indirect-Fired Kiln

In order to avoid contaminating the lime with the ash of the fuel a kiln may be used in which the fuel is fed at the sides and limestone at the top. This gives a purer product than in the other processes. Usually two fireplaces are provided. The hot gases from the fireplace pass up the kiln and burn the limestone. Wood is an ideal fuel since it produces a long flame without giving a very high temperature. A certain amount of moisture is also supplied by the burning wood which has been held to have a good effect on the product.

Natural gas and producer gas have been used as a fuel. These gases burn with a long flame and do not contaminate the lime. The gas is fed through openings at the side of the kiln and air is supplied through holes in the bottom of the kiln. Very large kilns can be used in this method since the gas can be made to burn in all parts of the kiln.

Many Processes Patented

A large number of processes for lime-burning has been patented in the United States. A few of the typical patented methods will be given as they actually appear in the patents.

The usual method of burning lime under the continuous process with external fires is by the use of wood as fuel. Wood has a comparatively low calorific value, yielding sufficient heat to effect the calcination of the lime-rock without overburning the lime; but its cost now as a fuel is high in most localities as compared with that of coal and the available supply is constantly diminishing. The employment of coal in place of wood as fuel with ordinary methods of conducting combustion results in overburning of the lime. The calorific power of coal being much higher than that of wood, the intense heat developed by its combustion results in the formation of a slag by the melting of fusible impurities in the lime-rock and there is obtained a product which will not slake thoroughly or only after a long period, often slaking to some extent after it has been made up into plaster or mortar and applied to buildings or elsewhere, producing the very undesirable effect known as "pitting." The combustion of an ordinary coal-fire in a kiln takes place mainly within the furnaces and is expended upon the furnace-walls rather than upon the lime-rock, causing rapid deterioration of linings and producing a short flame of small volume which is incapable of properly filling the cross-section of the kiln-body and burning the mass of rock uniformly throughout, but instead climbs the walls of the kiln where the draft is strongest and burns the lime at the sides more rapidly than at the center. Any artificial acceleration of a pure-air draft through a coal-fire merely tends to intensify the combustion and increase the rapidity with which the heat units are envolved.

The Eldred Process

In applying the invention of Eldred, patent No. 692,257 (February 4, 1902) to the burning of lime with external coal-fires there is passed through the fire as a draft-current or draft under artificial acceleration furnished by any suitable means, such as a fan-blower, a mixture of air and a neutral gaseous diluent. The latter may conveniently be derived from the kiln itself in the form of the gaseous products of the calcination of the lime and the combustion of the fuel. The gas driven off by heating the limestone is carbon dioxide or carbonic acid (CO_2), and the products of combustion are mainly free nitrogen and carbon dioxide, both of which are neutral as respects combustion—that is to say, they are non-combustible in oxygen and are non-supporters of combustion. They act as a diluent and carrier for the air.

This artificially-accelerated draft when passed through the coal bed on the grate maintains the combustion of the coal sufficiently to produce a rapid and abundant evolution of combustible gases; but on account of the dilution of the air in the draft by the kiln-gases, the expansion which it undergoes by being heated by these gases, and the speed of the draft, combustion is incomplete within the furnace and a considerable quantity of fuel-gases escapes into the body of the kiln. Here the heating agent—namely, the flaming draft or current which passes off from the fuel bed—may be supplied with additional air to complete the combustion of the fuel-gases and obtain the maximum evolution of heat which they are capable of affording.

The final evolution of heat from the fuel takes place within the body of lime-rock to a far greater extent than when the fires are supplied with a pure-air draft. In other words, the heat of the fuel is evolved at the point where it is needed and where it can do direct work in calcining the lime and is not uselessiy expended in overheating the furnace-walls and overburning the lime at

Editor's Note

IT IS GOOD to review occasionally the patent history of an industry. Many bright ideas, as well as many seemingly absurd ones, are brought forth by inventors who are bent on improving the art. Many inventions fail because they are brought forth at a time when the industry is not ripe to receive them. Then they are forgotten.

The patent history of lime is prolific. There are about 150 more patents than those abstracted here. In this article the author has endeavored to confine his attention only to process patents in the art of making quick lime.

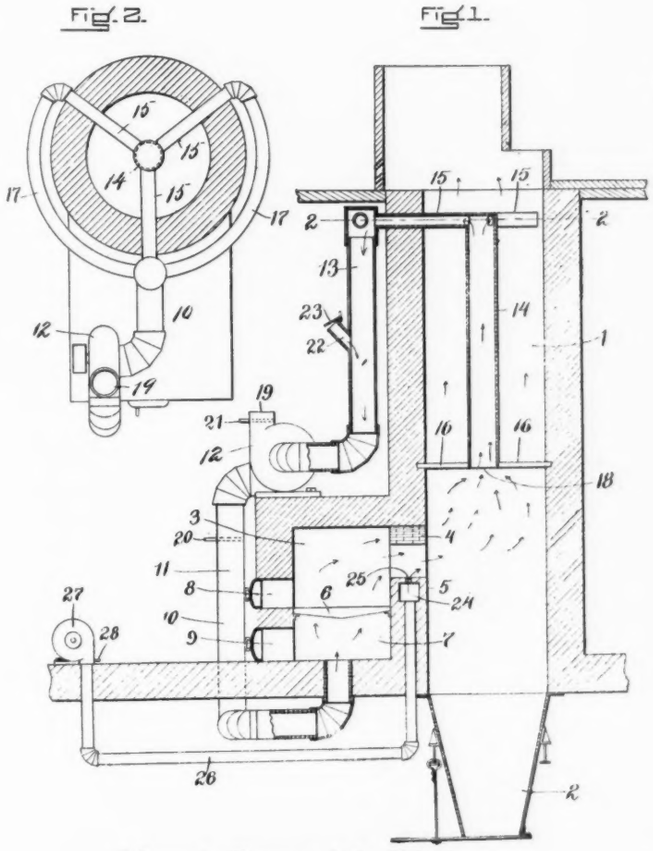
It will be noted that most of them are intended to give greater fuel, or greater thermal, efficiency. Thus it has long been recognized that lime burning can be improved upon in this regard. The same holds true today.

While it may appear that much in this article is of mere historical interest, the editor believes there may yet be something in it that will stimulate new ideas making for greater economy and efficiency in this very ancient art.—The Editor.

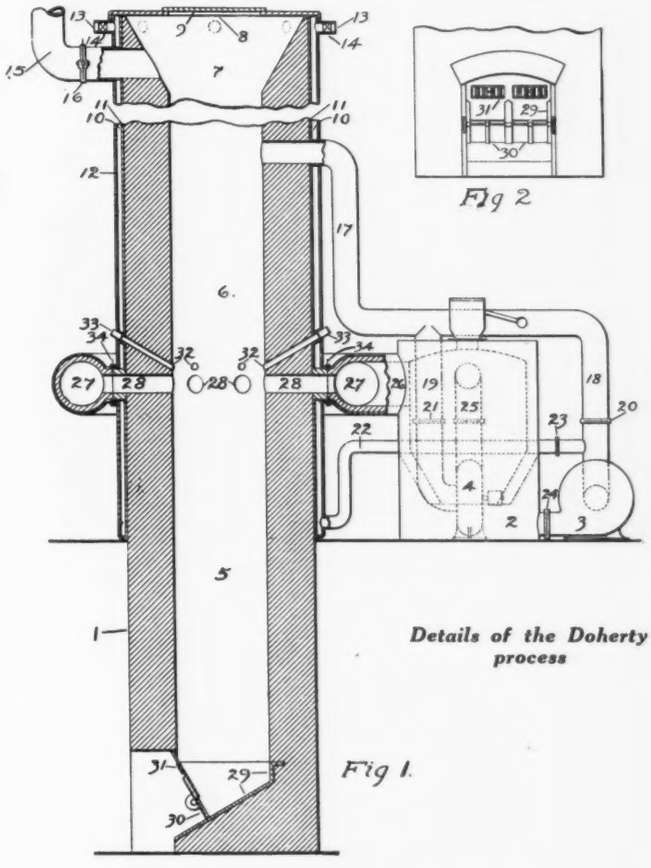
the mouth of the furnace. It naturally follows that this process effects great economy in fuel.

Of the accompanying drawings, Fig. 1 represents a vertical section of a kiln for carrying the process into effect. Fig. 2 represents a horizontal section on the line 2-2 of Fig. 1. The same reference characters indicate the same parts in both figures.

Referring to the drawings, 1 represents the cupola or calcining chamber of the kiln, in which the material to be calcined is placed, the said cupola having an upper outlet to the atmosphere, and 2 represents a cooler at the lower end of the calcining chamber. The broken stone or other fragmental material to be calcined is fed into the top of the cupola 1, and the burned lime



Schematic diagram of the Eldred process



Details of the Doherty process

is from time to time withdrawn from the cooler 2. The 3 is a furnace, of which there may be more than one, communicating with the cupola 1 through an opening or arch 4 and having a bridge-wall 5, grate 6, and ash-pit 7 below the grate.

The figures 8 and 9 represent the fire and ash-pit openings, provided with suitable doors. The 10 is a draft pipe or conduit connecting at its upper end with a flue 14 in the cupola and at its lower end with the ash-pit 7 and having interposed in it a fan-blower 12. The part 13 of the conduit 10 above the fan 12 constitutes a delivery-pipe therefor. A gate or valve 20 controls this delivery-pipe. The fan has also an auxiliary outlet or delivery pipe 19, controlled by a gate or valve 21, through which a portion of the kiln-gases may be disposed of without causing them to pass through the fire. At 22 the suction-pipe 13 is provided with an air-inlet, controlled by a valve 23. By adjusting this valve the relative proportion of air and kiln gases in the draft may be exactly controlled. The flue 14 is placed vertically and centrally in the cupola with an inlet-orifice 18 at its lower end and is supported from the walls of the kiln by radial upper and lower arms 15, 16.

The upper arms 15 are hollow and in connection without side pipes 17, 17 form passages connecting the flue 14 with the upper end of draft-pipe 10. To prevent the flue from burning out, it may be constructed of refractory material or protected in any suitable manner. While the flue has a beneficial effect in drawing the flame into the center of the lime-rock, yet it is in no wise essential to the proper carrying out of the invention and may be omitted and the kiln gases drawn from any convenient point in the cupola.

The bridge-wall 5 is provided with a conduit 24, having outlets 25 along the crest of the wall and connected by a conduit 26 with an auxiliary fan-blower 27, the blast from which is regulated by means of a gate or valve 28 in the conduit. A supply of air capable of being accurately regulated is thereby added to the heating agent or outdraft from the furnace 3, as this outdraft passes into the body of lime-rock in order to complete the combustion of the fuel-gases within said body of rock. The final air-supply may be added in any other suitable manner and at a different point if desired.

During the operation of the kiln the door covering the ashpit opening 9 is kept closed, so that a forced draft may be obtained through the body of fuel on the grate and the whole of the draft for the fire is supplied through the pipe 10. The fan 12 is run at such speed as to accelerate this draft to a considerable extent above the speed of the natural draft of the fire, and thereby to secure a vigorous expulsion of the flame and gases proceeding from the fuel bed from the furnace into the cupola.

The Doherty Process

The patent to Doherty, No. 938,987 (November 2, 1909), uses the heat derived from the combustion of producer gas for burning the lime.

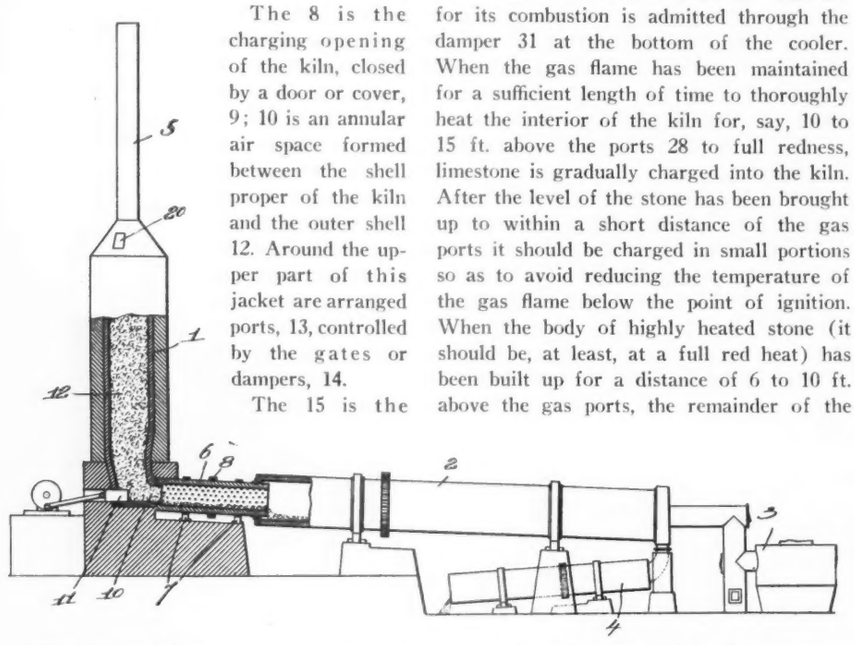
Fig. 1 is a section through the kiln and producer on a vertical plane through their axis, the blowers being shown in elevation. Fig. 2 is a front elevation of the lower part of the cooler showing the doors for the discharge of the lime and the ports for the inlet of the air for the combustion of the pro-

ducer gas. The 1 refers to the lime-kiln proper; 2 is the gas producer, 3 is the blower supplying the draft current to the producer and 4 is the blower supplying the kiln gas to the producer gas.

The 5 is the lower portion of the kiln, commonly called the "cooler"; 6 designates the upper portion of the kiln in which the stone is dissociated or burned, and 7 designates the upper portion of the kiln whose function is simply to insure sufficient time to contact between the stone and hot gases from the dissociation zone to enable the stone to take up from the gases all the heat which it is capable of absorbing.

The 8 is the charging opening of the kiln, closed by a door or cover, 9; 10 is an annular air space formed between the shell proper of the kiln and the outer shell 12. Around the upper part of this jacket are arranged ports, 13, controlled by the gates or dampers, 14.

The 15 is the waste-gas stack of the kiln, having a gate, 16; 17 is a pipe or conduit conveying a portion of the kiln gas to the suction pipes 18 and 19 of the fans or blowers 3 and 4, respectively; 20 and 21 are gates on the respective suction pipes 18 and 19; 22 is a pipe connecting the lower part of the air jacket 10 with the suction pipe 18 of blower 3 having a gate, 23.



The Truesdell process—a combination of stack and rotary kiln calcination

The 24 is the discharge pipe of blower 3, and 25 that of blower 4. The 26 is the producer gas conduit leading off from the producer and connected with a bustle-pipe, 27, encircling the kiln. This bustle-pipe, 27, has connections, 28, into the shaft, 6, of the kiln.

The 29 is the metallic hopper in which the cooler, 5, terminates. This hopper is provided with doors, 30, operated in any convenient manner, and air inlets, 31. The air inlets are so designed that their free area may be regulated at will.

The numbers 32, 32, etc., are ports passing through kiln walls, and permitting the ignition of the gas when the kiln is started in operation and the barring down of the lime; 33 are plugs closing these ports; 34 are suitable valves or dampers on the gas inlets into the kiln.

Operation by the Doherty Process

The method of operation is as follows: The gas producer having been brought into operation, the producer gas which, at first, is allowed to escape into the atmosphere until the producer is in normal operating condition, is allowed to pass into the pipe 26, through the bustle-pipe 27 to the gas ports 28, through 28 into the kiln. By means of torches or red-hot irons introduced through the openings 32 the producer gas is ignited immediately upon its entrance into the shaft of the kiln and burns. The air for its combustion is admitted through the damper 31 at the bottom of the cooler. When the gas flame has been maintained for a sufficient length of time to thoroughly heat the interior of the kiln for, say, 10 to 15 ft. above the ports 28 to full redness, limestone is gradually charged into the kiln. After the level of the stone has been brought up to within a short distance of the gas ports it should be charged in small portions so as to avoid reducing the temperature of the gas flame below the point of ignition. When the body of highly heated stone (it should be, at least, at a full red heat) has been built up for a distance of 6 to 10 ft. above the gas ports, the remainder of the shaft can be filled as rapidly as may be desired.

The Truesdell Process

In burning lime in the rotary kiln the usual process is, first, to crush the limestone to such a size as to pass a ring 4 in. in diameter or less (depending somewhat on the nature of the stone) and then to introduce the crushed limestone without screening into the rotary kiln. This crushed material contains particles or lumps which vary greatly in size, and sometimes it contains as high as 10% of limestone dust or powder. As the heat economy of a rotary kiln is naturally low, attempts have been made to increase its efficiency by introducing boilers and economizers into the path of the waste gases and by using dust chambers to prevent as much as possible the clogging of the draft passages through the boilers. It was found, however, that the waste-heat boilers and dust chambers entailed considerable expense in cleaning and keeping in order besides interfering more or less with the continuous operation of the kiln, and to avoid this difficulty it has been proposed to utilize the waste heat from the rotary kiln to burn the limestone partially in a vertical kiln instead of utilizing it in boilers, economizers, etc., and then to feed the partially-burned limestone from the vertical kiln into the rotary kiln where the burning operation was completed. Where the vertical kiln was thus used it was found to be necessary to keep the limestone in as large pieces as practicable and with a minimum dust content in order to prevent the draft through the vertical kiln from becoming unduly clogged, and in order to secure a proper and complete burning of the large lumps or pieces before their discharge from the rotary kiln it was found necessary to maintain the temperature in the vertical kiln substantially at the point of disassociation from the limestone of its CO_2 gas, for if a lower temperature were employed in the vertical kiln the amount which the large lumps were burned in the rotary kiln was not sufficient to enable them to be completely burned during their passage through the rotary kiln. In such cases an incompletely burned product would result.

In patent No. 1,180,455 (April 26, 1916) to Truesdell, the uncrushed limestone is first preheated to a temperature sufficient to soften it so that it will readily be disintegrated, but insufficient to effect the disassociation therefrom of its CO_2 gas, and then passed through a disintegrator which readily disintegrates or granulates and reduces it to a uniform granular condition, and then passed through a rotary kiln where it is properly burned. The preheating of the rock to the desired temperature is accomplished entirely by heat which is discharged from the rotary kiln and, therefore, without the expenditure of any fuel other than that which is required for burning the lime, and the operation of crushing or disintegrating the limestone after it has thus been heated can be accomplished with very much less expenditure of power than when the limestone is cold.

Referring to the drawings, 1 designates a vertically disposed stationary kiln having an opening, 20, in its top into which the limestone may be delivered, and 2 is a rotary kiln of any suitable construction.

The 3 is a gas producer for producing the heat to burn the lime in a rotary kiln. The lime is discharged from the rotary kiln into a rotary cooler 4, as usual. The construction and operation of the rotary kiln and its associated gas producer is too well known to need description. The stationary and rotary kilns are so situated relative to each other that the hot gases which are discharged from the rotary kiln pass into the lower end of the stationary kiln 1 and are discharged through the stack 5 thereof. Situated between the rotary kiln and the stationary kiln is a disintegrator 6 which may be of any suitable construction but is preferably a rotary disintegrator through which the limestone passes in moving from the stationary to the rotary kiln. This dis-

integrator is sustained in suitable bearings 7 and is roated by any suitable means, and at such speed as may be desirable. As herein shown, it is provided with exterior gear teeth 8, which mesh with and are driven by a suitable driving gear. The disintegrator will preferably be provided on its interior with projections or other means which will operate to disintegrate the material passing through. The disintegrator is arranged to receive limestone from the lower end 10 of the stationary kiln and to discharge it into the upper end of the rotary kiln.

In carrying out the invention the limestone in its natural state and without being crushed is delivered into the stationary kiln 1 through the opening 20 and it is fed from the lower end of the stationary kiln to the disintegrator by any suitable means, such as the reciprocating plunger 11. During the burning operation the heat from the rotary kiln passes up through the stationary kiln 1 and heats the limestone 12 therein to a point at which it is easily disintegrated. The limestone, coarse and fine, is then passed into the disintegrator 6 in which it becomes thoroughly disintegrated and reduced to granular form of practically uniform size, this operation being very easily accomplished with the expenditure of a minimum amount of power because of the fact that the limestone is in an easily disintegrable condition. The disintegrated limestone is then delivered to the rotary kiln where it is burned in the usual manner. The result is a high grade lime of uniform quality.

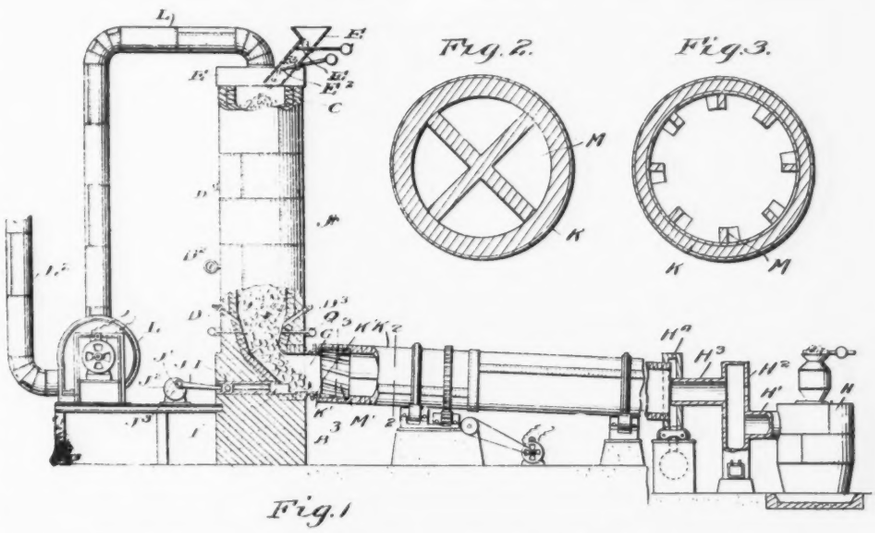
The Jones Process

The invention of Jones, patent No. 1,011,804 (December 12, 1911), consists in the process of burning lime by the employment of combination stationary and rotary kilns, in connection with a gas producer, and by the admixture of a quantity of limestone with the fuel of the gas producer, whereby a long and slow burning flame may be produced, the limestone thus admitted, being reduced by heat from its carbonate to an oxide state, and giving off carbonic acid gas which mixes with the producer gas, the oxide of lime within the gas producer, becoming slaked as it reaches the water with which the producer is sealed, and thus having a tendency to keep the cinder from slagging, and causing the producer to work more easily and better in every way than without presence of the limestone mixed with the fuel.

Another and an important object of the invention consists in the method of forming lime by the use of combination kilns and gas producer, or other heat producing material, wherein the dust formed by the lime passing through the rotary kiln may be gathered up in a vertical kiln and retained by the particles of limestone therein, thus avoiding large, expensive dust chambers.

Still another and important feature of the invention resides in the provision of partitions, formed longitudinally through the kiln, and designed to divide up the material as it passes through the kiln, and offering a greater radiating surface against which the lime contacts as it passes through the kiln.

Fig. 1 is a vertical sectional view through a combination vertically and horizontally disposed kiln. Fig. 2 is a sectional view on line 2-2 of Fig. 1 and Fig. 3 is a sectional view on line 3-3 of Fig. 1.



The Jones process—a combination of stack and rotary kiln used with a gas producer; some of the limestone is also mixed with the fuel of the gas producer

Reference now being had to the details of the drawings by letter A designates a vertically disposed stationary kiln mounted upon a suitable foundation B, said kiln having preferably a steel shell with a fire brick lining C and provided at intervals with openings D, forming means whereby instruments may be inserted for the purpose of breaking down any arches which may form within the kiln, and D^2 is a pyrometer employed for the purpose of indicating the temperature of the heat of the kiln. The upper end of the stationary kiln has a hopper E of special design, and so arranged that the draft upon the kiln will not be affected by the discharge of the limestone therein. Within said hopper are the two balanced partitions designated respectively by letters E^1 and E^2, the limestone being adapated to be fed to the hopper in any suitable manner.

The lower portion of the vertical kiln, adjacent to its exit end, is contracted and disposed at an inclination, and communicates with a laterally extending shell G about which one end of the kiln K rotates, a suitable ring K^1 fixed to the shell G^1 serves to close the space intervening between the shell and rotary kiln. The rotary kiln is mounted upon anti-friction rollers, and may be driven in any suitable manner, and at such a speed as may be found necessary to produce the best results.

A gas producer H acts as a suitable means for supplying heat to the kiln. Leading from the gas producer is a pipe H^1 which communicates with the vertical stack H^2, which serves as a connection for the purpose of conducting gas from the producer to the kiln, while the bottom of said stack serves as a chamber for the collection of soot from the gas and which stack communicates through the passageway H^3 with the chamber H^4 in an opening in which one end of the rotary kiln is disposed. By this arrangement it will be noted that a free passageway will be afforded from the gas producer through the two kilns.

Opening into the lower contracted portion of the upright stationary kiln is casing I in which a reciprocal feed plunger I^1 is mounted, the latter being pivotally connected with a pitman J, which in turn is pivotally connected to a pin J^1 mounted eccentrically upon the disk J^2, fixed to the shaft J^3, and which may be driven in any suitable manner, and at such a speed as may be desired to cause the limestone to be delivered to the rotary in proper quantities.

Leading from the sealed top of the stationary kiln is a pipe L communicating with the fan casing L^1 and from which latter a pipe L^2 leads through which the gases drawn from the kilns may escape. By the provision of the fan it will be observed that the draft upon the kilns may be regulated to a nicety, and the heat acting upon the lime being burned easily regulated.

By reference to the cross-sectional view through the rotary kiln it will be noted that the latter is provided with interior partitions which intersect each other, and divide the kiln into a series of compartments, the partitions being designated by letter M. These partitions are provided so that the material as it is fed by a worm feed M^1 into the various compartments will be subjected to a much greater heating surface

than would be the case were it not for the partitions. As the limestone enters the rotary kiln it will be partially disassociated from its CO_2 gas, and by the rotary movement of the kiln at an inclination the lime will be fed forward gradually, being subjected to the action of the flame and enabling it to be thoroughly and uniformly reduced to an oxide state.

Positioned about the lower portion of the vertical kiln are the pipes *Q* which lead through the wall of the kiln and are provided for the purpose of admitting steam into the vertical kiln to commingle with the particles of limestone, and which will serve to prevent the particles from sticking together or to the wall of the kiln, and which steam will also assist in the process of disassociating the CO_2 gas from the limestone before it enters the rotary kiln.

In operation by the admixture of a certain percentage of limestone with the fuel in the gas producer, carbon dioxide gas is formed, and a slow burning long flame will be produced, and as the limestone, which is mixed with the fuel is converted by the heat from its carbonate to an oxide state, the CO_2 gas will be given off and the oxide of lime within the fuel, as it reaches the water, will slake and have a tendency to keep the cinder from slagging, thus causing the gas producer to work more satisfactorily than would be the case without the addition of the limestone to the fuel.

The effect of the CO_2 gas given off from the limestone in the gas producer is to mingle with the producer gas and produce a long and slow burning flame within the rotary kiln. When the temperature within the vertical kiln has registered sufficiently high, which may be determined with the use of a pyrometer at any proper location therein, the rotary kiln is put in motion, and a certain quantity of limestone will be fed therein from the vertical kiln and be moved forward into the burning zone of the rotary kiln. The limestone in the vertical kiln will follow down to replace the amount, which will be fed by a variable movement of the plunger. By the use of the horizontal kiln of a considerable diameter divided into compartments, the length of the kiln may be appreciably shortened, and by so doing the flame from the gas producer may be carried immediately through the rotary kiln, imparting its heat to the lime in the several compartments and up into the vertical kiln, bringing the limestone within the latter practically to a point of disassociation of its CO_2 gas before the limestone enters the rotary kiln. By this method it will be noted that the entire length of the kiln will constitute a burning zone wherein the lime will be converted during its passage there through into an oxide state.

It will be noted that the dust formed within the rotary kiln will pass through into the vertical kiln and be retained therein among the particles of limestone and thus avoiding the use of specially constructed and expensive dust-chambers. The waste gases as they pass through and out the upper end of the vertical kiln will have given up their heat to the incoming limestone so that, as they make exit to the atmosphere, they will be practically cold, thus doing away with expensive waste heat steam boilers.

Other Patents

Other United States patents for making lime are given in brief form arranged in chronological order:

1. Garber, No. 152, March 25, 1837.

An artificial blast is supplied to a lime kiln by a blowing apparatus for regulating the combustion of the fuel and in consequence the calcination of the lime.

2. Smith, No. 174,387, March 7, 1876.

The calcination of lime by the use of coal, which is the principal fuel used, has been attended by great loss of such fuel, and the lime produced has been irregular and deteriorated in quality. This is owing to the difference in the quality and quantity of coal consumed in a given time, the impossibility of controlling the combustion so as to insure an even degree of heat, which is necessary to prevent the product being under or over burnt, and to adapt the heat to the lime or cement rock to be calcined, which, as is well known, requires a variation in the degree of heat as it varies in hardness and other qualities; and the deterioration in the quality of the lime by the action of the sulphur in the coal, and by the mingling of ashes therewith. These objections also exist to a certain extent when wood is used as fuel.

The object of the invention is to obviate these objections, by producing a perfect combustion and a uniform heat absolutely controllable at will, which enables one to produce and maintain a greater or less degree of heat at pleasure, according to the nature of lime or cement rock to be calcined, and other conditions insuring an even calcination from a liquid fuel which does not deteriorate the quality of lime or cement.

The invention consists in the method of manufacturing lime or cement at a single operation and producing an even quality of the same, which consists in subjecting the lime or cement rock to the action of heat produced by the active combustion of liquid fuel or vapor produced therefrom, associated with steam, superheated or not, and air.

3. Cummings, No. 182,419, September 19, 1876.

In the process of manufacturing lime or cement, the injection of a carbonized air-spray directly upon the stone at a red heat. By using air alone, with the perfect combustion obtained, a good red heat is obtained, just sufficient in degree to make a very fine article of lime or cement, and that will only glaze the furnace-brick, causing them to be very durable. With steam, however, under a perfect combustion, the heat is too intense, and exercises a deleterious influence upon cement and lime, as well as destroys rapidly the furnace-brick.

4. Hislop, No. 217,377, July 8, 1879.

The process of revivifying spent lime by submitting it to the direct action of the products of combustion from a furnace wherein carbonaceous matter is burned, also assisting the action of the said products by a jet or jets of saturated or superheated steam.

5. Dimelow, No. 237,500, February 8, 1881.

A process for the manufacture of hydraulic cement or lime from rotten or decomposed limestone, which consists in first burning the stone, then subjecting it to currents of air or steam in a tightly closed receptacle, and finally sifting the material, with or without grinding.

6. Livingston, No. 241,034, May 3, 1881.

The process for burning lime from a crystalline carbonate of lime which crumbles in the kiln when being heated, and consisting of the addition, in sufficient quantity, of silicious sand to coat the exterior surface of the fragments with a silicate of lime which is formed by the sand and lime under the influence of the heat in the kiln while the lime is being burned.

7. Brown, No. 263,310, April 29, 1882.

The process of burning lime and utilizing the waste gases thereof, which consists in exhausting the products of combustion from the kiln and forcing them by a jet of gaseous vapor under pressure into a carbureting-chamber and then enriching the carbureted mixture under pressure into a kiln, and there igniting it for burning the lime, whereby the hot products of combustion and gases are circulated through the latter and it is more uniformly burned.

8. Mathey, No. 330,603, November 17, 1885.

The process for making lime which consists in first crushing the stone to a suitable degree of fineness, then burning the crushed or pulverized stone in a revolving cylinder, whereby the particles of the stone are subjected to a constant and uniform heat.

9. Druecker, No. 358,437, March 1, 1887.

The process of burning lime consisting in drawing hot air from the top of the kiln, mixing it with cold fresh air and supplying the mixture to the fire.

10. Carleton, No. 399,496, March 12, 1889.

The process of calcining rock in a kiln having a barrel to contain the rock and arches leading thereto, consisting in applying an air-blast below the grate to create a draft, and in applying steam or a spray of water within the arch above the fuel to regulate the heat.

11. Barrow, No. 506,029, October 3, 1893.

The method of burning limestone for the production of lime which consists in exhausting the carbonic acid gas and other products of combustion from the bosh of

the kiln so that the air may enter the furnace without mixing to an appreciable extent with the said products.

12. Ransome, No. 515,017, February 20, 1894.

The process of slaking, disintegrating and cooling the clinker produced in burning combustible matter containing lime by passing steam through the burned mass before it is withdrawn from the furnace in which it is burned.

13. Westman, No. 651,684, June 12, 1900.

The process consists, essentially, in passing a mixture of highly-heated carbonic acid and steam into and up through a column of limestone to expel the carbonic acid contained in the limestone and to convert the latter into calcium oxide, then charging the expelled carbonic acid with water to cause the heat of the carbonic acid to convert the water into steam and thereby reduce its temperature, then conducting a portion of the cooled carbonic acid charged with steam into a regenerator to be highly heated therein and used in turn for expelling carbonic acid from the lime, as above specified, and finally drawing of the calcium oxide from the base of the column.

14. Westman, No. 670,047, March 19, 1901.

The improved continuous process of treating limestone with a highly-heated mixture of carbonic acid and steam as a sole medium of transferring heat, which process consists in expelling the carbonic acid from the limestone, bringing CO_2 in contact with water, to convert the latter into steam, and mixing the steam with the expelled carbonic acid, to form a mixture of carbonic acid and steam, and then reheating the mixture and passing it through the limestone, whereby lime and carbonic acid of maximum purity are obtained, the entire amount of carbonic acid evolved and employed being recovered.

15. Schubert, No. 685,064, October 22, 1901.

The process of producing lime or cement and combustible gases consisting in passing heated products of combustion of burning fuel through raw material as raw cement or calcium carbonate, thereby expelling therefrom all gaseous matter and vapors of water, thereafter mixing with said products of combustion, gaseous matter and vapors of water, steam or oil, or both steam and oil, and subsequently passing all these products through a body of highly-heated fuel.

16. Eldred, No. 692,257, February 4, 1902.

The process of calcining a fragmental mass of lime or cement forming material by conducting the combustion of fuel from an external seat with an artificially-accelerated draft-current composed of air and a neutral gaseous diluent, propelling the resulting heating agent into the mass by the force of the accelerated draft and supplying the heating agent with air to complete its combustion within the mass.

17. McTighe, No. 736,869, August 18, 1903.

The method of making lime and gas consisting in raising solid fuel to a high heat, by internal combustion, subjecting carbonate of lime to the heat of such fuel, and passing the gas evolved by the lime through the same fuel which is used to heat the lime.

18. Jones, No. 832,485, October 2, 1906.

The process of making lime consisting in reducing the limestone or other material of a lime nature to a granular condition with granules of such a size as will readily pass through a 1-in. mesh screen, introducing the same into the comparatively cool end of an inclined rotary kiln and causing heat of a high temperature to be passed through the kiln as the latter is rotated slowly, thereby causing the granular material to be agitated as it passes slowly through the kiln, the heat first driving off the CO_2 and reducing the material to an oxide state, the excess of heat afterward being utilized to prepare the material for the burning zone and for making steam.

19. Ellis, No. 843,878, February 12, 1907.

The process of calcining limestone which consists in mixing a predetermined amount of water with hot lime-kiln gases, whereby said water is vaporized, adding a predetermined amount of air, passing the resultant mixture through a shallow bed of ignited fuel at a rate greater than said fuel can react therewith and burning the resultant mixture in contact with limestone.

20. Reany, No. 862,657, August 6, 1907.

The process of burning lime rock consisting in agitating the particles in the cooler end of a heated receptacle, to gradually heat them and drive off any moisture, holding the mass in check to permit the heavier unburned particles to settle to the bottom and the lighter partially burned particles to advance to a hotter portion of the receptacle, again holding the particles in check to permit the lighter more advanced burned particles to rise to the surface and continuing this intermittent checking and separation of the particles by gravity until the particles are burned.

21. Doherty, No. 938,987, November 2, 1909.

The invention consists, briefly, of a lime-kiln in which the lower part or "cooler" of the kiln is deeper than is, at present, customary, a gas producer appurtenant to the kiln, a second and outer shell surrounding the main shell of the kiln and forming with said shell an open annular air space, said annular space having air inlets around its periphery at the top and connections from the bottom through a fan with the ash pit of the producer, air inlets at the lower part of the cooler, a fan for the purpose of introducing kiln gas into the ash pit of the producer together with the air before mentioned, and another fan for the purpose of introducing another portion of the kiln gas into the producer gas for the purpose of so moderating the temperature of the flame of the burning gas that danger of over-burning is avoided.

22. Jones, No. 1,011,804, December 2, 1911.

A process of burning lime consisting in the subjecting of the particles of limestone substantially disassociated from its CO_2 gas, to heat within a rotary kiln, and thus converting the limestone into an oxide state, of conducting the heat and dust generated within the rotary kiln into a vertical kiln containing particles of limestone in which the dust is gathered and retained by the limestone.

23. Doherty, No. 1,066,719, July 8, 1913.

The process of utilizing the heat of hydration of lime which consists in hydrating lime in a closed chamber by contacting the same with a current of air laden with water vapor, whereby the said lime is hydrated and the said air heated, continuously withdrawing from said heated air current a volume of the same which will contain sufficient heat to vaporize the water required in the hydration of said lime, passing the said volume of heated air in contact with water, whereby the said water is vaporized and the said vapor mixed with said air, passing the said air-water-vapor mixture through the lime in said closed chamber together with the volume of air that is required to sustain the combustion in the kiln in which said lime is burned, whereby a further portion of the lime in said chamber is hydrated and the said air heated, and passing the necessary proportion of such heated air into the lime-kiln in which said lime is burned to sustain the combustion therein.

24. Johannson, No. 1,177,865, April 4, 1916.

The invention relates more particularly to that class of furnaces having rotating tubes or retorts, such as are employed for burning lime, cement, bauxite or the like by means of a gas firing, by means of generator gas, or gas from coking ovens or similar gas. Furnaces of this class are usually heated by means of ground coal dust and air or of a liquid fuel. Latterly the rotating retort or tube into which the material to be burnt is fed has been heated by means of a generator gas. In connection with this class of furnace, burners have been employed, rigidly connected to the furnace head, so that the flame could only take effect in a certain direction in the retort.

According to the invention, the burner is horizontally and vertically movable on the retort head so that the heating flame may be directed to different parts in the retort, and may take effect at various points of the material passing through the same.

25. Hart, No. 1,179,180, April 11, 1916.

The object of this invention is to provide a process whereby gas may be practically used in the production of high-grade lime, even where the limestone contains considerable amounts of magnesia. The process consists in calcining the stone with a combustible gas which has been so greatly diluted with steam that a very long and comparatively cool flame is produced, simu-

lating in its effects the flame produced in the burning of wood in a lime kiln. The total amount of steam used is approximately 30% by volume.

26. Truesdell, No. 1,180,455, April 25, 1916.

Limestone is first pre-heated without dissociation so that it can be readily disintegrated. It is disintegrated and reduced to granular form and then passed into a rotary kiln when it is reduced to the oxide state.

27. Herber, No. 1,183,458, May 16, 1916.

A furnace for the reclamation of lime from carbon, oil and the like, consisting of a combustion chamber, suitable grate bars therefor, in combination with air supplying shafts provided with a plurality of perforations or slotted openings on each side thereof, supply pipes for introducing air into the lower ends of said shafts, and means to open or close any preferred openings within said shaft whereby the air will be supplied directly to the burning mass of material within the combustion chamber without reference to the change of position of said burning mass.

28. McCaig, No. 1,303,088, May 6, 1919.

The combination with a calcining kiln, of a stack base into which the gases from the kiln discharge, a stack leading for the base, said stack having an enlarged portion above and adjacent to the base, a bin arranged within the enlarged portion having its top and bottom substantially cone-shaped and spaced from the top and bottom walls of the enlarged portion of the stack, an inlet into the top of the bin, an outlet therefrom at the lower end delivering to the kiln and having a feed gate interposed therein, and vertical flues through the bin communicating with the upper and lower portions of the enlarged portion of the stack, whereby the heated gases from the kiln during their passage up the stack will completely surround the uncalcined material in the bin and thoroughly heat the same prior to its entry into the kiln.

29. Dwight, No. 1,315,952, September 16, 1919.

A method of producing lime which consists in thoroughly and intimately commingling finely reduced fuel material with carbonate of lime in a native finely divided condition, depositing this mixture in a thin layer upon a layer of lime and covering the said layer of mixed material with a third layer containing fuel without the admixture therewith of limestone, setting fire to the said covering layer and passing air through the entire body of material to cause combustion of the fuel component thereof.

30. Shaffer, No. 1,377,367, May 10, 1921.

In the conversion of a mineral carbonate to an oxide, the heating of said carbonate by establishing a combustion region upon a grate, forcing steam into the combustion region from below said grate, thereafter mingling the gases from the steam with the products of combustion producing a burning region, and continuously progressing said carbonate at a determined rate through said burning region produced by said products of combustion and mingled gases from the steam.

31. Pike, No. 1,472,935, November 6, 1923.

A calciner comprising an outer shell, a series of superposed hearths arranged therein in staggered relation, a series of rabble arms associated with and movable over each of said hearths, a rotatable column carrying said arms centrally extended through the shell, a bottom hearth for the shell situated below the lowermost hearth of the series of hearths a distance in excess of the distance between said hearths to provide an enlarged combustion chamber, means of advancing combustible fuel and air for supporting combustion within the said chamber, a series of rabble arms carried by the rotatable column and movable over the bottom hearth of the calciner for advancing calcined material to a discharge outlet, and a plow-shaped rabble tooth covering for each of the rabble arms associated with the said bottom hearth.

32. Warner, No. 1,542,195, June 16, 1925.

The process of making lime from limestone which consists in heating the same in passage through a rotary kiln to a temperature above that of dissociation and then transferring the heated mass, while still above the dissociation temperature to a heat-insulated receptacle and permitting the mass to remain in this receptacle for a sufficient time to complete the calcination.

33. Mehner, No. 1,550,557, August 18, 1925.

The process of calcining calcium carbonate in a furnace-generator to produce lime and carbon dioxide which consists in supporting a charge of calcium carbonate upon a pervious grate maintained within the lower portion of the furnace-generator admitting relatively cool combustible gas and steam to a zone immediately above said charge of calcium carbonate, admitting air into an upper zone of the furnace-generator, said upper zone constituting a combustion zone wherein the combustible gas is burned and is separated from the charge by the admitted relatively cool combustible gas and the steam, forming an intermediate layer, radiating the heat of said combustion zone through said steam and combustible gas zone upon the charge of calcium carbonate, in order to calcine the same, and then separating the lime and carbon dioxide by withdrawing the carbon dioxide from the space below the grate.

34. Ward, No. 11,610,906, December 14, 1926.

The process of burning lime which comprises placing relatively coarse broken lime-forming material in a chamber, heating said material by passing heated products of combustion through said chamber in contact with said material, placing fine broken lime-forming material in a chamber in the wall of said first-named chamber and heating said fine material solely by conducting of heat through said wall and entirely out of contact with products of combustion, whereby said fine material is changed to lime uncontaminated by products of combustion.

35. Heyl, No. 1,625,853, April 26, 1927.

A method of burning calcareous material consisting in blowing in a plurality of successive planes opposing jets of powdered solid combustible flaming at a vitrifying temperature, and blowing a separate jet of powdered calcareous material transversely successively to encounter said flaming jets.

36. Truesdell, No. 1,627,215, May 3, 1927.

The method of burning limestone in a kiln having a stack containing limestone, which consists in burning fuel exterior to the stack under conditions to produce products of combustion at a temperature in excess of that required for the efficient burning of limestone, withdrawing from the top of the stack waste gases which have a temperature less than that required for the efficient burning of limestone, commingling said waste gases with the products of combustion exterior to the stack and at a point beyond that at which said products of combustion are formed, whereby the temperature of the products of combustion is reduced to that required for efficient burning of the limestone, and then introducing to the stack the commingled products of combustion and waste gases at the reduced temperature.

Laboratory for Study of Potash Problems

IN ORDER to carry out the provisions of the Winter Act for chemical engineering research on the extraction of potash from leucite, alunite and other potash-bearing materials, the Nonmetallic Minerals Experiment Station of the United States Bureau of Mines, Department of Commerce, in cooperation with Rutgers University at New Brunswick, N. J., is enlarging its facilities to include work on leucite and alunite in addition to the work now in progress on New Jersey greensands and saline minerals from Texas and New Mexico. Equipment is being installed to conduct unit chemical engineering operations such as crushing, roasting, calcining, digesting, leaching, precipitating, clarifying, filtering, evaporating, etc. The scale of operations is the next stage beyond that of the chemical research laboratory and is designed to be the smallest scale in which the processes can be carried out in the same materials of construction and with the same type of equipment as would be used in the large-scale plant.

By working on this chemical engineering scale of operations it is expected to determine and solve some of the difficulties that are likely to be encountered in large-scale operations, especially such matters as corrosion of equipment, difficulties in handling the material, difficulties due to heat transfer, clarification, etc.

The new Boston plant, United States Gypsum Co., operations started on March 15

Another view of the Boston plant showing the storage silos and dock

U. S. Gypsum Co.'s Extensive Expansion Program Nearing Completion

Boston and East Chicago Plants in Production—Philadelphia and Detroit Plants Almost Ready to Operate

THE SECOND of the four large gypsum plants which the United States Gypsum Co. is establishing, in metropolitan areas, went into production on July 15. This new operation, called the East Chicago plant, is situated on the Indiana Harbor canal, East Chicago, Ind. Other new plants are located at Charlestown, Mass., to serve the Boston district; this plant started production on March 15 last. The remaining plants are located at Detroit and Philadelphia; both of these are rapidly nearing completion, particularly the Philadelphia mill.

Boston Plant in Operation

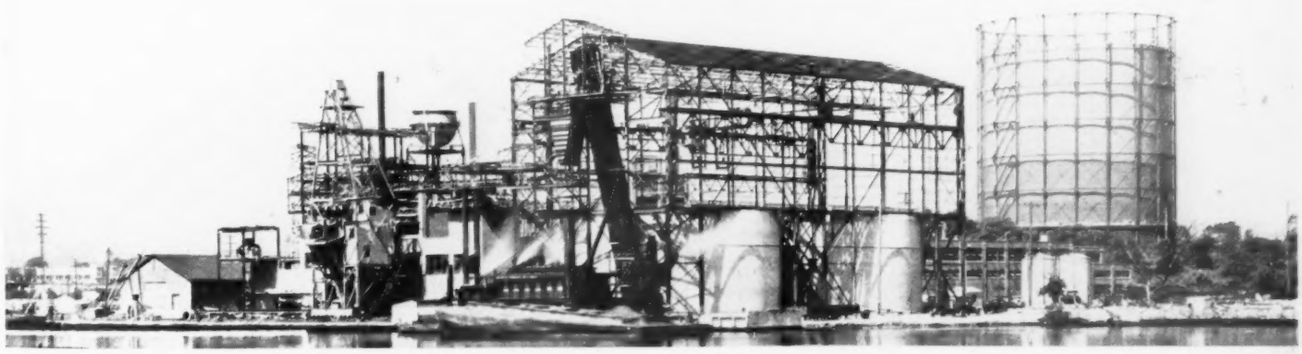
The Boston plant now in operation is turning out a full line of the company's products. It is located on tidewater at the mouth of the Mystic river in the Charlestown section of Boston. The site was selected particularly to permit water delivery of gypsum rock from the company's mines in Nova Scotia. The plant consists of two main divisions, the first comprising rock storage with unloading facilities and the other made up of the various manufacturing structures.

The rock storage consists of five concrete tanks or silos approximately 85 ft. high, each having a capacity of about 5000 tons of rock. These silos are located in a line along the edge of the property. A wooden dock outside the silos carries a traveling gantry which picks up the rock from the boats and delivers it to a belt conveyor along the dock. This conveyor delivers the rock through a weighing apparatus to an elevator which carries it to the top of the silos, where another conveying system carries it to any one of the five silos. The rock is taken to the manufacturing processes by a conveyor running in a tunnel under the silos.

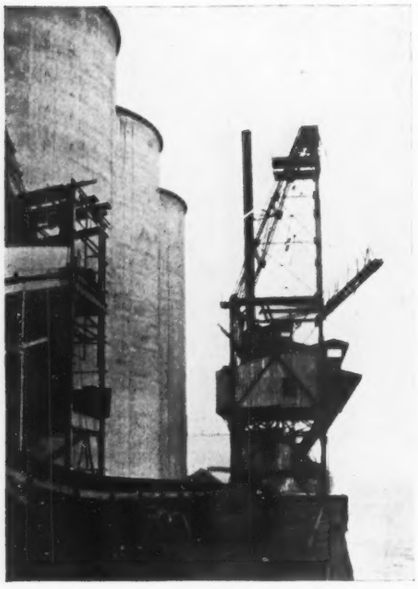
The manufacturing structures include calcining mill, warehouse and board plant, together with the small structures necessary to complete the plant. A double line of track extends directly into the plant.

Philadelphia Plant

The new plant at Philadelphia is located on the Schuylkill river in the southern section of the city. The rock storage at this plant is somewhat different from that at Boston, consisting of two concrete tanks 95 ft. in diameter and approximately 40 ft. high. As compared with Boston storage capacity, however, these two tanks will hold 50,000 tons or approximately double the total capacity of Boston. The unloading apparatus at Philadelphia will be almost identical with that at Boston, although the movement of the rock from the storage to the buildings will be entirely different, consisting of a



The Philadelphia plant as it appeared on July 16



Traveling gantry, unloading conveyor and elevator at the Boston plant

crane and conveyors operating in a steel structure which will surmount the two concrete storage tanks.

The manufacturing structures at the Philadelphia plant will also be much larger capacity than those at Boston, although the layout will be approximately the same. The calcining buildings and warehouse will be located on one side of a double line of railroad and a one-story board plant, 500 ft. long, on the opposite side. The area occupied by the tracks will be roofed over. The foundations of this plant are of concrete resting on approximately 1300 concrete piles.

Detroit Plant

The new plant at Detroit is similar in layout to that at Philadelphia, although of appreciably greater capacity. Rock storage is taken care of by three concrete tanks, 105 ft. in diameter, which will store approximately 80,000 tons of rock. Unloading and conveying apparatus will be similar to that at Philadelphia, as are also the manufacturing buildings. This plant, while known as the Detroit plant, is actually located in the city of River Rouge on the river of that name, which separates the two communities. The plant is approximately one mile from the Detroit river and on a 22-ft. river channel which serves the adjacent Fordson plant of the Ford Motor Co.

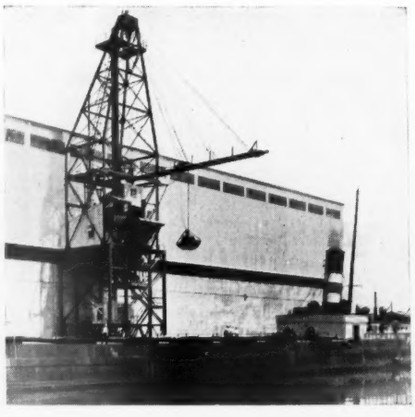
Both the Boston and Philadelphia plants will get raw material by boat from Nova Scotia, while the rock for the Detroit plant will come from Alabaster, Mich., on Saginaw Bay. This Alabaster plant is now being increased to give the added output when the Detroit plant goes into operation.

The erection of the Boston, Philadelphia and Detroit plants is under the management of the Morton C. Tuttle Co. of Boston, who are supervising the installation of all equipment as well as the construction itself.

East Chicago Plant

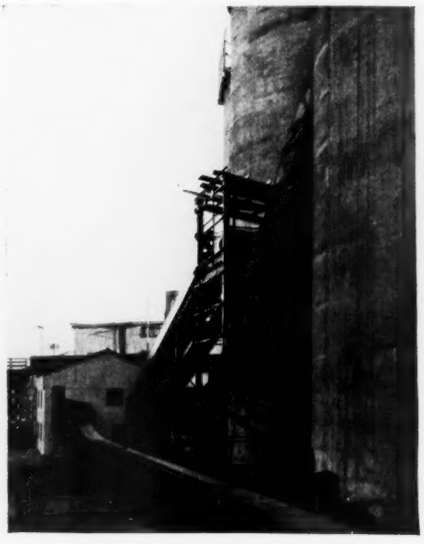
The East Chicago plant is similar in general design to the Boston mill, except that it is considerably larger, comprising 21 buildings and covering an area of 16 acres. It and its sister plant at Detroit will supply primarily the market in the north central states.

Excavation was begun late in August,



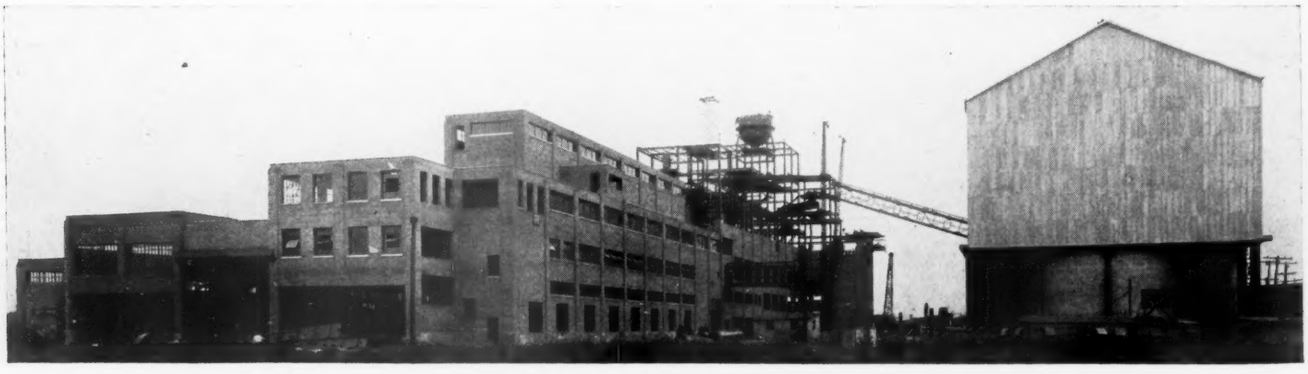
Unloading rock gypsum at the East Chicago plant

1928, and the project completed in July, 1929, or in about 11 months. Some delay was caused by the necessity of making extensive test borings to ascertain foundation conditions, preliminary to actual construction. An interesting feature of the concrete work was that a good deal of it was carried out during the cold winter months; at times the temperature dropped around zero, but erection work and installation of equipment went on just the same. The Turner Construction Co., which had the contract for construction and installation, supplied the necessary salamanders for preheating the aggregate to carry on the winter concrete work.



Unloading conveyor carries the rock through a weigh house to an elevator running to the top of the silos, Boston plant

There are five major units at the plant and these are: the calcining mill, 280 ft. long by 80 ft. wide and four to seven stories in height; the "Sheetrock" plant, 740 ft. long by 60 ft. wide and one and two stories high; the gypsum block plant, 340 ft. long by 100 ft. wide and two stories high; the warehouse, 206 ft. long by 80 ft. wide and four stories high; and the rock gypsum storage bin, 466 ft. long by 160 ft. wide and 112 ft. in height. Other buildings are: the office building, gate house, locker room and garage, laboratory, oil storage, train shed, dehumidifier house, cement rock bin, substation, secondary switch house, pump house, deep well house, process well house, unloading crane, main line switch house, and ash



The Detroit plant which is rapidly nearing completion; production is expected to start in August

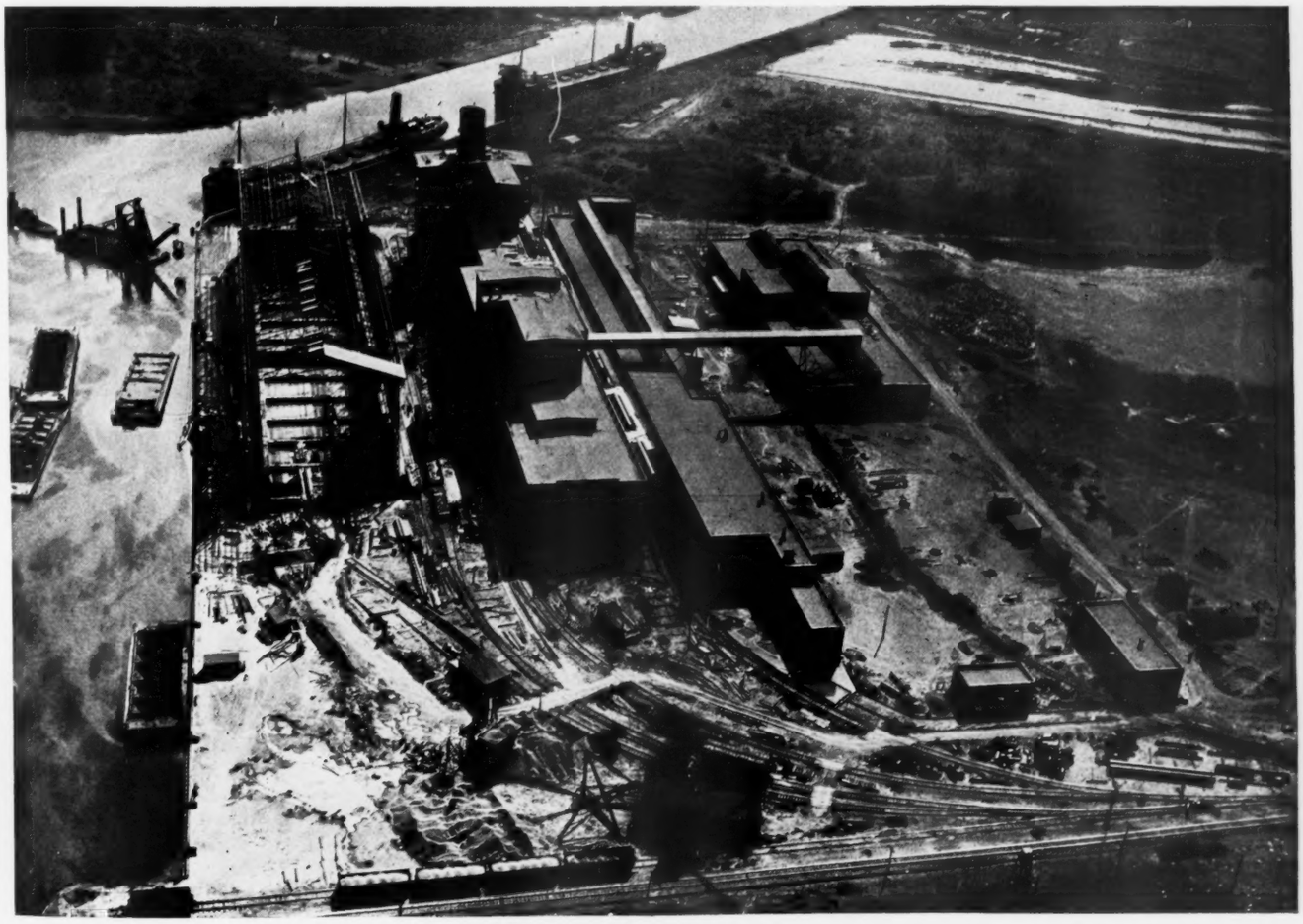
The new East Chicago, Ind., plant, the largest of the four mills in the expansion program

handling house. The total floor area of all the buildings is 309,400 sq. ft.

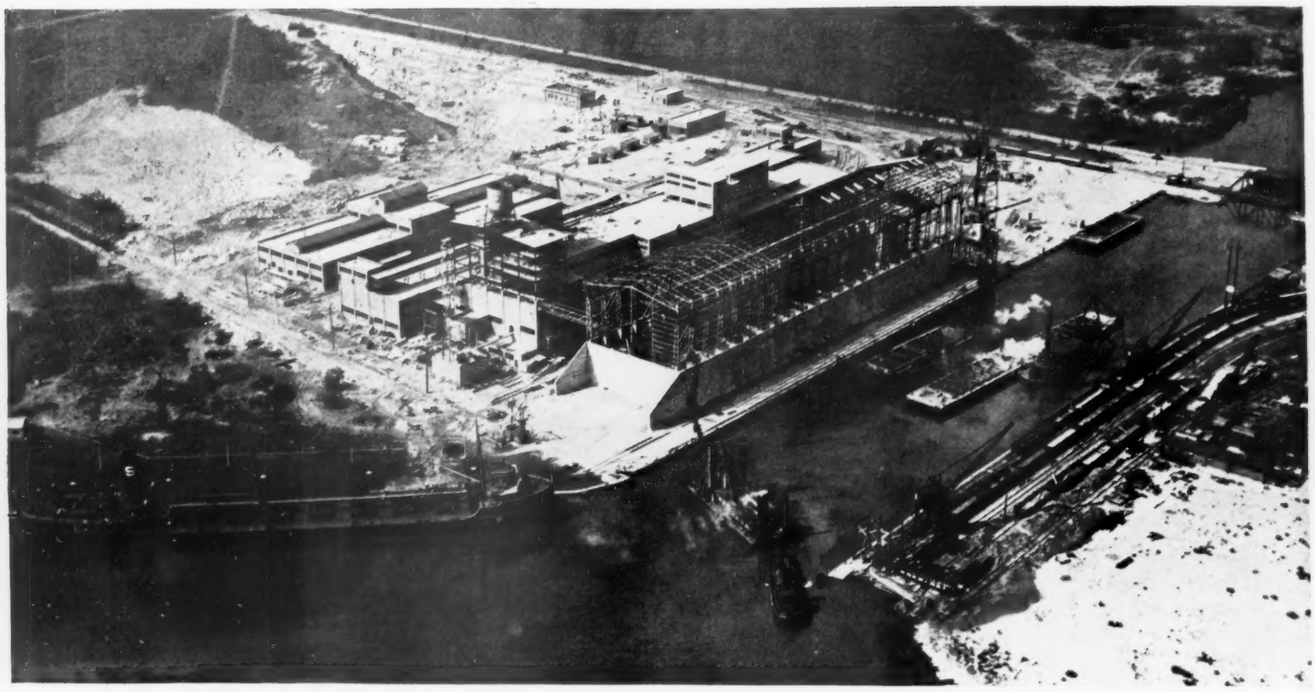
The plant will use rock gypsum brought in by water route from the company's Alabaster, Mich., quarry. A wooden dock has been constructed by the Indiana Harbor canal and this has been equipped to unload ships carrying the rock gypsum. In order to load the rock at Alabaster, the company had to make some special arrangements at that place, for the water there was too shallow to allow a dock of the required length to be built. This matter was facilitated by the construction of a crib, 7000 ft. out on the lake; on this crib is a large enclosed rock bin which is filled at the rate of 300 tons per hour by buckets running on an aerial tramway system. This line is supported from eight steel towers, from 60 to 80 ft. in height and resting on cribs. A belt conveyor carries the rock to the ships anchored alongside the storage bin.

The dock at East Chicago has unloading equipment which can unload the largest of the carriers in 24 hours or less. A belt conveyor serves to carry the rock from the dock to the storage bin. This bin holds 125,000 tons of rock and rests on extra heavy foundations. Its retaining walls are of reinforced concrete, 40 ft. in height, of the cantilever type, forming the basis of this structure. On the top of this, rising to a height of 70 ft., is a superstructure of structural steel with copper-bearing corrugated-steel roofing and siding.

Rock is reclaimed from storage by a



Aeroplane view of the new East Chicago plant showing the location of the various mill buildings. Note the excellent water and rail facilities afforded the new plant for receiving and shipping

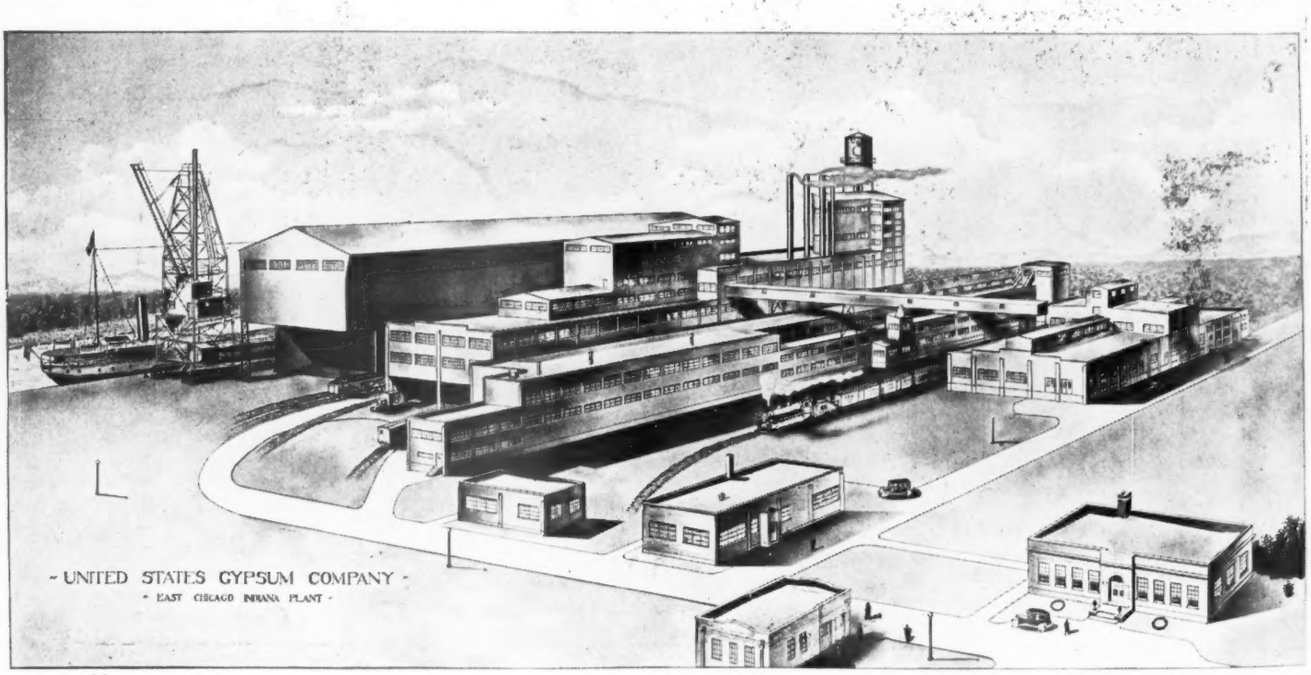


Incoming boats can discharge directly at the dock of the new East Chicago plant. The bins hold about 125,000 tons of rock and are served by a 3-yd. traveling clamshell

traveling crane equipped with a 3-cu. yd. clamshell bucket. This discharges via a hopper and feeder to the reclaiming belt conveyor which carries the rock direct to the calcining plant, where the rock is crushed and screened. The fines are then spouted to the dryer bin and the oversize carried to the cement rock bin.

The dryer bin has a reciprocating feeder through which the rock is fed to a belt conveyor running to the dryers. After drying the rock is elevated, passed to the secondary crushers and again screened; the fines go to separator feed bins, and rejects of the screen go to the rock bin. From the separator feed bins the material is fed to mechanical separators which remove the finer sizes, sending them direct to land plaster bins. The coarser rock resulting from this separation is passed to bins feeding a Raymond pulverizer, and after pulverizing, the fine rock is conveyed to the land plaster bins also.

A screw conveyor carries the rock from the land plaster bins to the calcining kettles of the company's own design and fired by coal. After calcination, the stucco is discharged to steel hot pits, from which it is drawn by means of a conveyor into a bucket elevator, which discharges it into the kettle stucco bins. This bin material after screening is carried by screw conveyors to stucco storage bins of 1000-ton capacity, located in the block and board plants and also in the warehouse. The warehouse is equipped with a battery of plaster mixing machines and



Architect's perspective of the United States Gypsum Co.'s new plant at East Chicago, Ind.

Bates packers. Electric trucks are used to transport the material.

Wallboard Plant

The board machine, on which are produced "Sheetrock" wallboard, "Rocklath," "Standard X" gypsum lath, and "Gyplap" sheathing, is of the company's own design. The manufacturing process is quite similar to that in use in most wallboard plants; the reinforced edges of the board are made after a patented process owned by the company. There are several improvements on the board machine, notably a chamfering device which chamfers the edges of the fiber covering to insure edges of the same thickness as the rest of the board. A new cutting device has been installed by which the ends are said to be cut cleaner than formerly. The paper coatings for the board are made in four plants owned by the company.

The block plant has an automatic block machine on which gypsum partition tile, column and beam covering and steel-reinforced roof deck tile are made. Other products to be made at the plant, besides the above, are "Red Top" wall plasters and finishes, terra cotta plaster, plate glass stucco and gypsum retarder for portland cement mills.

Dust-Proof Features

An efficient dust-collecting and washing system is a feature of this plant. The vents from the dust collectors, elevators and other pieces of equipment discharge into a washing system where all dust is removed. This system consists of a number of tunnels, into which a large quantity of water is discharged through spray nozzles, causing a dense fog and collecting all dust too fine to be taken up by the dust collectors.

The entire plant is electrically operated, each piece of equipment being driven by an individual electric motor. Power is supplied by the Northern Indiana Public Service Co. through the United States Gypsum Co.'s own transformer stations.

Special provision has been made for shipping the company's products in mixed cars; this includes the laying of over 3½ miles of side-track.

Structural steel and concrete construction was used throughout. The outer walls of the buildings are of brick, the floors of reinforced concrete, designed to carry varying loads from 50 lb. per sq. ft. to 600 lb. per sq. ft., and the roofs are of the United States Gypsum Co.'s 3-in. by 12-in. by 30-in. "Pyrobar" roof tile laid on special bulb tees and protected by a 20-year tar gravel roof covering. All foundations are of concrete (spread footing type) with the exception of the rock storage bins, which are supported on wood piles. "Pyrobar" partition tile was used for all partition work, and all buildings are equipped with steel sash and steel doors. The construction work was carried out by the Turner Construction Co.

The plant was designed by and constructed under the direction of J. H. Nold, chief engineer of the United States Gypsum Co., assisted by E. B. Johnson, supervising engineer; S. L. Griffith, assistant to chief engineer; J. M. McGee, in charge of design; A. A. Frosdick, works manager, and R. W. Lee, resident engineer.

Lawrence Portland Cement Co.'s Advertising Campaign

UNDER THE CAPTION "Lawrence Portland Cement Capitalizes Cooperative Advertising," Herbert Kerkow has an article in the June issue of *Class*, a magazine devoted to advertising and selling, which contains comments of considerable interest to all rock products producers. Following are extracts:

"Capitalizing the excess strength of its product, "Dragon" portland cement, without lessening public confidence in cement generally as a building product, is the purpose of the present advertising campaign of the Lawrence Portland Cement Co.

"During the past few years the Portland Cement Association has met with unusual success in its cooperative campaign for the industry. New markets have been created for the product, and all manufacturers in the cement industry have profited. But the buyer has come to look upon all brands of portland cement alike because all brands, of necessity, meet the specifications of the American Society for Testing Materials.

"Concurrent with the educational campaigns of the Portland Cement Association, the advertising of the member companies has featured typical applications with poster display of individual brands and trademarks. Nothing has been done to create brand preference in the mind of the buyer.

"The Lawrence Portland Cement Co., naturally, would not undertake any advertising campaign that would in effect disclaim or discredit any of the advertising that has been done by the association. Yet there is no reason why the fact that Lawrence Dragon portland cement exceeds the standard specifications by 40% in quality should not be capitalized. Such an advertising campaign need involve only friendly and legitimate competition within an industry which has profited through cooperative development of its markets.

"The copy in this campaign merely reasons with the cement buyer or prospect that all cements are good, some are better than others and a certain amount of care should be exercised in choosing the brand of cement best suited to the job.

"This advertising campaign has three objectives: to create brand consciousness; to create general preferences for Lawrence brands, and to secure better cooperation and support from Lawrence dealers.

"The copy in most of the advertisements of the campaign is short. The trade-mark of the brand is prominently displayed on every advertising page. All of the advertisements are reproduced in two colors, and the schedule, involving an appropriation of $27,500, includes the following magazines: *Engineering News-Record, Construction Methods, Architecture, The Supply Man and Building Material Merchant.*

"One of the advertisements has featured testimonial copy, while the others have been built upon every-day human situations.

"One page shows a large illustration of a man buying gasoline at a typical filling station. The headline is, 'and a quart of oil.' The copy for this advertisement says that motorists are learning to ask for oil by name, and suggests that it is just as important to buy portland cement by name.

"Another advertisement shows a housewife at a store counter. The headline is, 'I'd like a cake of soap.' The copy explains that the housewife of today has learned that she gets more value in some soaps than others, and adds that the contractor should be just as careful in selecting cement.

"The copy for other advertisements is similar. Typical of the illustrations are a waitress taking an order in a dining room, a man buying cigarets in a cigar store, and two painters painting a wall.

"Eight factors helped to coordinate this advertising campaign with the work of the company's salesmen and with dealers. Meetings were held in the district offices and at the main office in order to explain the purpose and the plan of the campaign. Salesmen were encouraged to capitalize the printed sales talks of the advertising pages. Each salesman was supplied a portfolio with reprints. Reprints were also mailed periodically to the dealer and consumer list. Reprints were again sent to dealers reproduced in a house organ which assumed the task of showing the dealer how to coordinate his own sales plans with the advertising campaign. Extra reprints were furnished dealers in reasonable quantities without any charge.

"The house organ, named the *Lawrence Dragon*, is a 16 pp. booklet attractively printed in two colors. The booklet has a heavy cover, and a flap on the front cover seals on the back cover so that the booklet can be mailed without an envelope. This house organ features typical applications of the product as well as sales methods.

"Several special news-making activities were undertaken. For example, the opening of a large new bridge was utilized by having the first freight train to cross it consist of a large shipment of Dragon cement.

"That the campaign has been successful has been indicated in two ways. First, the number of Lawrence dealers has increased 57% since the campaign began. Second, increased attention has been given to cement quality, as evidenced by buyers in the construction industries and by increased space and discussion given to the subject in trade and technical publications."

Design of Sand and Gravel Washing and Screening Plants

Part IV—Conveying, Scalping and Crushing

By Frank M. Welch
Chief Engineer, American Aggregate Corp., Greenville, Ohio

PART I of this series covering some of the fundamentals of the industry was published in the April 27 issue, Part II on plant design and stripping and excavation methods in the June 8 issue and Part III on transportation and elevation in the July 6 issue.

Belt Conveyors

It still remains that a large percentage of commercial deposits are dry pits, no part extending below water, and therefore using the belt conveyor for the main elevating unit. These conveyors should be equipped with the best grade of heavy canvas or rubber belting. Various plant managers disagree as to the relative merits of rubber or canvas for this purpose, but if carefully specified, either give excellent service. The life of the belt will be increased and maintenance decreased if the head, tail, and snub pulleys are made of amply large diameter. Another life saver for the belt is to use troughing carriers with only about 20-deg. concentrators if possible, as this reduces the breaking tendency at the bending line. Belts should be installed wide enough that the required capacity can be handled between the bending lines, thereby leaving several inches on both edges with little or no wear. Three pulley troughing carriers rather than the continuous troughing type meet the approval of most operators. Automatic take-ups should always be used in preference to the old screw type at the tail end of the conveyor.

As stated heretofore, too many bucket elevators have been improperly designed. This type of equipment was borrowed from the grain and coal industries where buckets mounted on belts or on single strands of malleable iron chain were used. This construction was found entirely inadequate for the severe service found in handling sand and gravel, and the successful elevators now in use consist of the heavy steel continuous type, mounted on two strands of steel thimble roller chain. Both the carrying and return runs operate on tracks, and if given a slope of 70 deg. or less to the horizontal, and designed large enough to operate slowly, these elevators are a very dependable unit. They can be still further improved by buckets of the super capacity type.

Feeding

Regardless of what excavating, transporting, or elevating methods are used, somewhere in the chain of handling the flow of material should be converted from intermittent to uniform, in order to insure efficient screening and maximum production. When the excavating unit is anything except a suction dredge or a ladder dredge the initial flow of material is intermittent. Inasmuch as the belt conveyor is at present the most universally used elevating unit, the automatic feeder, located at the foot of the conveyor and driven from the conveyor tail shaft, is in most common use. Where field conveyors are the transporting means, the feeder must be located in the field hopper serving these units.

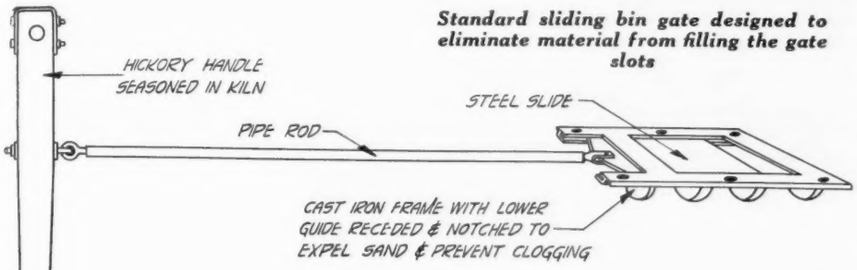
Ordinarily however, the material is received at the foot of the belt conveyor by either dump cars or by clamshell, either of which deliver it intermittently into a receiving hopper which is also a part of the feeding operation. Whether a belt conveyor or a bucket elevator is used for elevating there is a limit to the size of boulders it can safely handle. Furthermore, whether the material is first elevated to the main screens or to a scalping screen, much maintenance can be saved on these screens by reducing the number of large boulders before reaching the top of the plant. Therefore, unless an entirely fine deposit is being worked, grizzly bars should be placed over the top of the receiving hopper. The space between these bars is regulated by the size of the elevating unit and the arrangement is governed by the frequency of the oversize stones.

When the occurrence of boulders in the deposit is infrequent, the grizzly bars

The No. 2 plant, Roquemore Gravel Co., Montgomery, Ala. Excavation is by 3 1/2-yd. revolving dragline and 48-in. belt conveyors carry material to plant. Capacity is about 200 cars per day

may be placed horizontally and the man who dumps the cars will find sufficient time to break the occasional boulders with a sledge or push them to one side if they are too rough to break. When the percentage of boulders is too great for manual breaking, the grizzly should be sloped sufficiently to by-pass the boulders to a preliminary breaker, preceding the conveyor or elevator, quite similar to the ordinary arrangement found at limestone plants.

In the bottom of the receiving hopper, which may be constructed of wood, concrete or steel, or a combination of any of these, a sliding or segmental gate is located directly over the automatic feeder. Inasmuch as the feeder is automatic, this gate needs regulation only when the excavating equipment has just moved from a coarse portion of the deposit to a fine portion or vice versa.



Standard sliding bin gate designed to eliminate material from filling the gate slots

Types of automatic feeders have probably advanced through as many stages of development during the past comparatively few years as any other step in modern gravel plant operation.

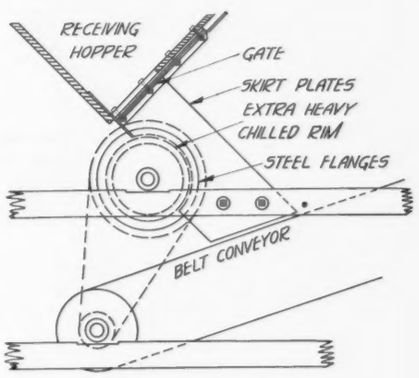
The original feeder, borrowed from standard coal tipple design was of the reciprocating type. The wear and tear on this and the power required to drive it, were all excessive and it was replaced by the steel apron feeder. Although this unit was a great improvement over the reciprocating type, the wear and power required to handle such an abrasive material were still too great. It was finally found that the raw material from most good gravel deposits required less control at the feed point than had been assumed. It was found that the plainest, most inexpensive type of drum or rotary feeder would control the flow uniformly from most deposits. Some deposits were found where a uniformly fine grade of gravel prevailed throughout, in which the size of gate opening in the bottom of the receiving hopper would sufficiently control the flow, thereby eliminating the necessity of the feeder. This condition however is quite extraordinary and in fact there are plenty of deposits—especially in the southern states—which contain so much clay intermixed with the gravel, that the steel apron feeder is the only equipment which will drag the raw material out of the receiving hopper.

In plants where the skip hoist, the cableway excavator, or the clamshell, dump raw material into a receiving hopper on top of the plant, automatic feeders are often placed at the discharge gates of these hoppers where the material enters the screens. As a rule however there is so much water mixed with the material under such circumstances, that the automatic feeder cannot be depended upon for consistent uniform feeding. In case of the skip hoist, the operator as described heretofore, is in position to constantly watch and regulate the hopper gates which control the flow of material into the screens; and with the clamshell or cableway operations, a man in the screen room must watch the feed constantly. Some operators find that the feed at this point can be fairly well controlled by a jet of water, so located as to uniformly control the feed into the screens, but for various reasons this system has not met with entire success.

Whatever uniform feeding method is used, if it is properly located, it need only occur once in the flow of material. From that point on, uniform and maximum capacity in each unit should be assured.

Scalping

Scalping is a process which only needs to be considered by operators whose deposits contain a large amount of oversize to be crushed. It is true that the problems presented by some scattered plants justify scalping screens or grizzlies which serve only to remove drift wood, roots or



Typical rotary feeder

The Interstate Sand and Gravel Co. plant at Covington, Ind.—an excellent example of an operation which crushes its material completely before washing and screening. Three-track tipple, modern timber construction and complete housing are features

other foreign matter from the material, but the term scalping primarily refers to the preliminary screening process whereby part of all the oversize is separated and by-passed direct to the crushers before reaching the main washing and sizing screens. Bar screens or grizzlies were originally used and still are by some operators, for scalping. This type however, permits many flat slabs to pass through between the bars and much efficiency and height can be gained by the revolving screen for this purpose.

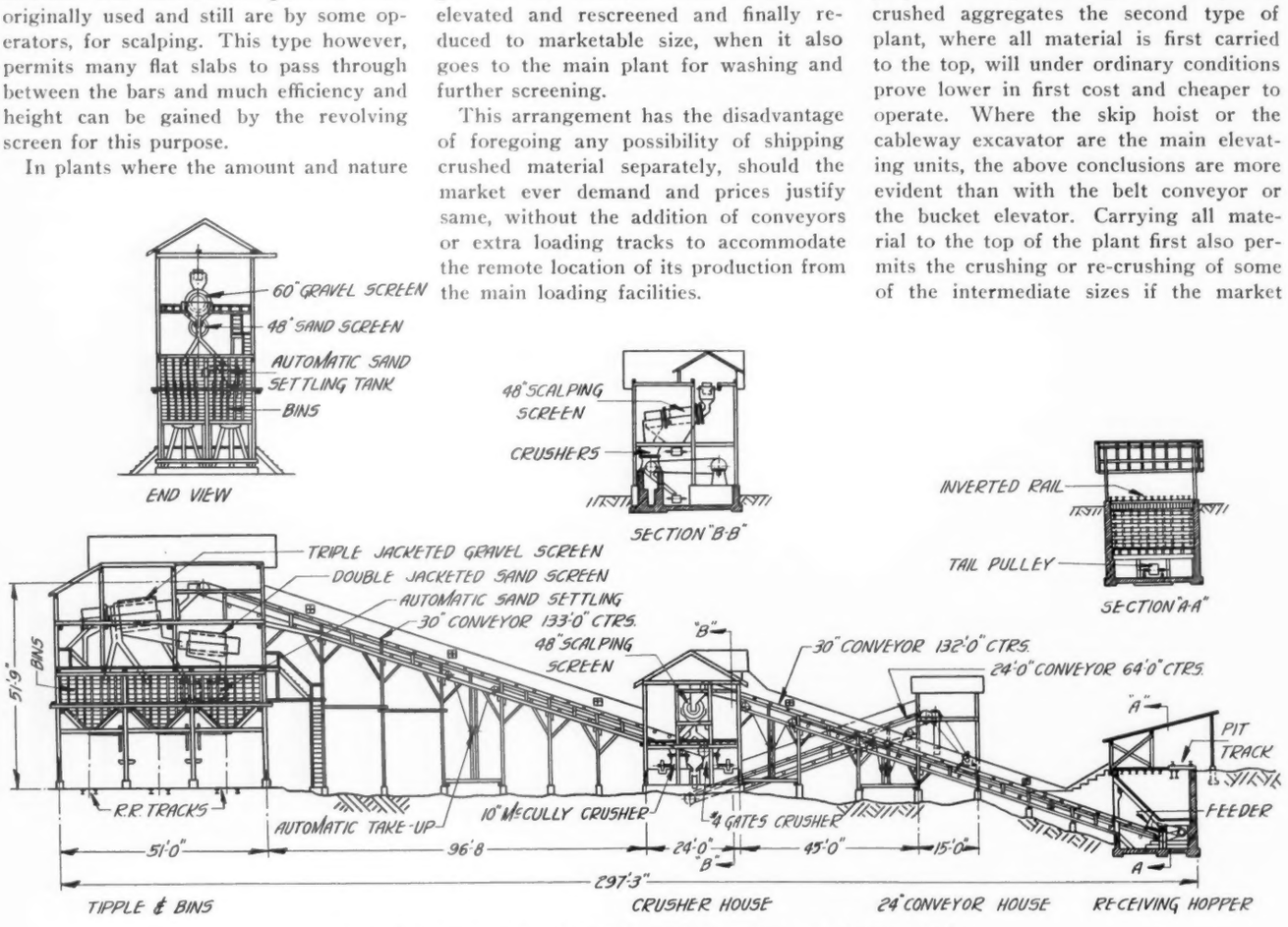
In plants where the amount and nature of the oversize justifies both primary and secondary crushers, a very efficient scalping arrangement is found in the double jacketed revolving screen. This screen by-passes the largest of the oversize direct to the primary crushers and the smaller oversize to the secondary crushers. This of course greatly relieves the main screens and adds to the capacity of the plant.

There are various other mechanical types of grizzlies made up of discs, traveling bars, etc., which have their useful applications under circumstances requiring their particular merits.

Crushing

Gravel plants can readily be divided into two distinct classes in regard to the location of the crushers in respect to the flow of material. One class embodies an arrangement whereby the entire crushing process is completed before the material is carried to the top of the main plant for washing and screening. This arrangement involves a crushing plant or crusher house, which includes the scalping screen and all the crushers, located between the receiving hopper and the main plant. Here all marketable material is separated and sent to the main plant. The oversize goes to the crushers from which it is elevated and rescreened and finally reduced to marketable size, when it also goes to the main plant for washing and further screening.

This arrangement has the disadvantage of foregoing any possibility of shipping crushed material separately, should the market ever demand and prices justify same, without the addition of conveyors or extra loading tracks to accommodate the remote location of its production from the main loading facilities.



Plan of Interstate Sand and Gravel Co. plant, Covington, Ind.

The other type of plant is that wherein all oversize is elevated with the balance of the material to the top of the plant before any screening, scalping or crushing is done, except in some cases where a preliminary breaker must be located at the receiving hopper as described heretofore. In such an arrangement the oversize passes to crushers near the ground and must be re-elevated to the top of the plant where it can be returned to the main screens and re-mixed with the gravel sizes, or may be spouted from the elevator to a separate stone screen where various grades of purely crushed stone can be prepared, loaded and shipped.

Some operators reason that the first described arrangement is more economical in design and operation on account of the fact that all the crushing is done on the ground before being elevated to the top of the plant. They feel that carrying the uncrushed oversize so high, then dropping it to the crushers at the ground level, then re-elevating it, is a waste of power. Careful analyzing however shows the cost of this type of plant is greater than the second type and that the power required as a rule is as much if not more. Therefore, with the added advantage of being prepared to produce grades of purely crushed aggregates the second type of plant, where all material is first carried to the top, will under ordinary conditions prove lower in first cost and cheaper to operate. Where the skip hoist or the cableway excavator are the main elevating units, the above conclusions are more evident than with the belt conveyor or the bucket elevator. Carrying all material to the top of the plant first also permits the crushing or re-crushing of some of the intermediate sizes if the market demands. This is made possible by the fact that the crushing unit is adjacent to the main screening plant.

Crusher Types and Mountings

There are five available types of crushers, namely, the gyratory, jaw, disc, roll and hammer mill. Large gyratory and jaw crushers usually do the preliminary breaking while smaller or "fine reduction" gyratories and disc crushers handle the secondary crushing. In certain sections, such as eastern Pennsylvania, where sand is at such a premium that some of the gravel is ground up into dust to augment the sand production, the roll crusher and hammer mill are brought into use.

All crushers, regardless of type, should be mounted on concrete foundations. Supporting them on the plant structure has always proved very detrimental to the plant and the machinery in the plant, on account of the severe and constant vibrations. Furthermore they should be

so clustered around the foot of an elevator that they can all feed readily into the same elevator and at the same time, keeping their tops on about the same level to facilitate access from the second floor of the crusher house. Over the top of the crusher or crushers, an I-beam, equipped with a standard I-beam trolley and a chain hoist, should be strongly supported at a sufficient height and centrally located to enable the quick lifting and handling of all crusher shafts and other parts. This I-beam should extend several feet through a large door outside one or both sides of the building and over a loading track in order to facilitate the handling of replacements. All crushing surfaces should be specified of manganese steel in gravel plants.

Crusher Drives

Although throughout the balance of the plant, separate motors for driving each unit are found advisable, in the crusher room there is a distinct advantage in driving all crushers from a common line shaft. A group of three of four crushers, whose aggregate required horsepower would total say 150, could all doubtless be driven at the same time efficiently by one 100-hp. motor. The reason for this is that in such a group it seems that there never is a time when all of the crushers are operating at full capacity at the same time. Therefore driving the group with one motor reduces the connected load considerably.

On account of the high starting torque required, the crusher room motor should be of the slip ring type or else a good heavy friction clutch should be installed in connection with the motor driven pulley on the line shaft.

As stated under the subject of elevators, the re-elevating unit from the group of crushers, should be of the heavy steel continuous type, mounted on two strands of steel thimble roller chain. Some operators re-elevate their crushed stone by means of a short belt conveyor which meets the main conveyor about half way up and discharges the crushed stone back into it. This is not however considered the best of practice because of the difficulty in properly discharging the material in the middle of the main belt and the adding of the extra load on the conveyor half way up.

(To be continued)

The Herscher Quadrangle

THE HERSCHER quadrangle, lying about 40 miles southwest of Chicago, in western Kankakee and southern mill counties, is the basis of a report (Bulletin No. 55) from the Illinois State Geological Survey. The geology and mineral resources of this area are described and illustrated and distribution of rocks of commercial importance carefully mapped.

The Bauxite Industry in 1928

THE PRODUCTION of bauxite in the United States in 1928 was 375,426 long tons, valued at $2,273,898, an increase of 17% in quantity and of 14% in total value, as compared with 1927, according to a statement of the United States Bureau of Mines, Department of Commerce.

In Alabama bauxite was produced in 1928 from the Eufaula mine, in Barbour county, and the Davis Hill No. 3 mine, in Henry county. The output was considerably more than in 1927, of which about 68% was shipped for use in the abrasive industry, 26% for use in the chemical industry and 6% for use in the aluminum industry.

Bauxite was produced in Georgia in 1928 at the Vans Valley and Dupont mines, in Floyd county; the Lane McMichael mine, in Macon county; the Wriley mine, in Wilkinson county, and from a deposit in Sumter county, near Andersonville. The output from Georgia in 1928 was about 46% less than in 1927. Of the output in 1928, about 92% was shipped for use in the chemical industry and the remainder was shipped for use in the aluminum industry.

In Tennessee only one mine—the Montague mine, in Hamilton county, was worked in 1928, from which was produced a small quantity of bauxite that was shipped for use in the chemical industry.

In 1928 bauxite was produced in Arkansas at four mines—the Sweet Home and Hoekstra mines, in Pulaski county, and the Bauxite and Superior mines, in Saline county. The production of bauxite in Arkansas in 1928 was 361,236 long tons, an increase of 19% over 1927. The main production originated in the Saline county field, in which there was a small increase, but the mines in Pulaski county produced important quantities, the increase over 1927 being 148%. The production in Arkansas was shipped mainly for use in the aluminum industry, followed in order by the chemical and abrasive industries, but a comparatively small quantity was shipped for use in refractories.

The producers of domestic bauxite reported sales during 1928 at prices ranging from $5 to $7 a long ton. The average for Arkansas bauxite was $6.07 a ton, for Alabama $6.41, for Georgia $5.03 and for the United States $6.06. Probably the values reported to the Bureau of Mines by most operators represent more nearly production costs, as the greater part of the domestic bauxite is produced by consumers of bauxite. The quoted prices‡ for bauxite were as follows: Domestic: No. 1 chemical ore, 55 to 60% Al_2O_3, less than 5% SiO_2 and less than 3% Fe_2O_3, $7.50 to $8.50 a long ton f.o.b. Georgia mines; foreign, Dalmatian low-silica bauxite $4.80 to $6.50, Istrian $5.50 to $7, and French red bauxite $6 to $8 a metric ton c.i.f. New York.

BAUXITE (INCLUDING BAUXITE CONCENTRATES) EXPORTED FROM THE UNITED STATES, 1924-1928

Year	Long tons	Value
1924	77,065	$3,979,832
1925	78,633	4,134,455
1926	87,770	4,741,260
1927	121,858	7,800,491
1928	112,984	5,210,912

‡*Engineering and Mining Journal*, Vols. 125 and 126, 1928.

Survey of New Castle Region

A DETAILED study of the geology and mineral resources of the New Castle, Penn., quadrangle has been completed and incorporated in Pennsylvania Geologic Survey No. 5. The bulletin gives a condensed description of the mineral products produced in the area as well as data power and transportation lines serving the district.

Sixth Biennial Report of Division of Highways

THE REPORT covering the transactions and activities of the Division of Highways and the Division of Contracts and Rights of Way of the State of California for the biennium ending June 30, 1928, has been published and is available for distribution. The book also constitutes the 6th biennial report of the California Highway Commission.

The report is unusually well illustrated showing highways and their mode of construction throughout the entire state.

BAUXITE PRODUCED IN THE UNITED STATES, 1924-1928

	Ga., Ala., and Tenn.*		Arkansas		Total	
Year	Long tons	Value†	Long tons	Value†	Long tons	Value†
1924	19,940	$156,990	327,630	$1,981,000	347,570	$2,137,990
1925	20,220	109,809	296,320	1,878,450	316,540	1,988,250
1926	20,680	116,650	371,570	2,298,550	392,250	2,415,200
1927	17,110	95,920	303,830	1,892,860	320,940	1,988,780
1928	14,190	80,668	361,236	2,193,230	375,426	2,273,898

*No production from Alabama in 1924, 1925, and 1926, and no production from Tennessee in 1927.
†Value f.o.b. mines.

DOMESTIC BAUXITE SOLD BY PRODUCERS TO INDUSTRIES IN THE UNITED STATES, 1924-1928, IN LONG TONS

Year	Aluminum	Chemical	Abrasive	Cement and refractory	Total
1924	225,780	54,870	66,400	520	347,570
1925	173,040	67,420	73,720	260	314,440
1926	241,850	77,960	72,710	230	392,250
1927	186,490	62,410	71,790	250	320,940
1928	218,398	83,992	72,931	105	375,426

SUPPLY OF BAUXITE IN THE UNITED STATES, 1924-1928

	Domestic production		Imports		Total new supply	
Year	Long tons	Value	Long tons	Value	Long tons	Value
1924	347,570	$2,137,990	201,974	$ 909,493	549,544	$3,047,483
1925	316,540	1,998,250	353,696	1,549,120	670,236	3,537,370
1926	392,250	2,415,200	281,644	1,187,497	673,894	3,602,697
1927	320,940	1,988,780	356,580	1,572,236	677,520	3,561,016
1928	375,426	2,273,898	350,111	1,534,498	725,537	3,808,396

National Crushed Stone Association Directors Approve Code

Trade Practice Committee Has Report Ready for January Convention—Probably Will Be Held in Cincinnati

THE DIRECTORS of the National Crushed Stone Assocation meeting at Atlantic City, N. J., July 26 and 27, approved a code of trade practice which will be submitted to the annual convention of the industry January 20 to 23, 1930, and on which action will be taken at a trade practice conference of the industry, under the auspices of the Federal Trade Commission on January 23. While not finally settled at this writing, the place of the 1930 convention will probably be Cincinnati, Ohio. Other business transacted at the directors' meeting included definite steps to increase the income of the association.

Report of the Trade Practice Committee

Otho M. Graves, chairman of the committee on trade practice, reported as follows:

"At the meeting of the board of directors held in Cleveland, January 24, 1929, the president was instructed to appoint a trade practice committee for the purpose of constructing a code of trade practice applicable to our industry, setting forth those actions illegal in themselves or conducive to unfair competition from which all of us should voluntarily agree to refrain.

"President Wise promptly appointed the following committee:

Otho M. Graves, chairman, Pennsylvania.
Howard E. Bair, Ohio.
H. E. Rodes, Tennessee.
T. I. Weston, South Carolina.
E. J. Krause, Missouri.
O. P. Chamberlain, Illinois.
W. L. Sporborg, New York.

"The first meeting of the committee was held in Washington on March 12 with the following members present: H. E. Bair, O. M. Graves, E. J. Krause, H. E. Rodes, W. L. Sporborg.

And in addition thereto: Dr. Hugh Baker, Henry P. Fowler, A. T. Goldbeck, J. R. Boyd.

"It early appeared in the discussion that illegal or unfair competitive methods could be most feasibly formulated by reducing them to a suitable number of adequate resolutions. The first work of the committee at this meeting was to tabulate the unfair trade practices existing to a greater or less extent in our industry; and, secondly, to study the resolutions which have been adopted by other industries. It is significant to observe that 51 industries or associations have held trade practice conferences under the auspices of the Federal Trade Commission and have adopted suitable resolutions governing the conduct of their activities, and that some seven or eight others are now pending.

"Certain resolutions were tentatively adopted at the first meeting of the committee which was then adjourned to meet again at the call of the chairman.

"The second meeting of the committee was held on April 18 and 19 in Washington in a room at the Chamber of Commerce building, courteously offered to the committee for its use. Those attending were as follows: H. E. Bair, O. M. Graves, E. J. Krause, W. L. Sporborg.

And in addition thereto: W. F. Wise, A. L. Worthen, J. R. Boyd, Hugh P. Baker, Henry P. Fowler, N. C. Rockwood.

"During the interim between the two meetings the members of the committee read a considerable amount of literature on the subject and studied further resolutions which had been adopted by other associations. As a result of this broadened vision, certain changes were made in the resolutions previously adopted, and the work of the committee completed by the addition of other appropriate rules or resolutions.

"Before presenting herein the rules which have been unanimously adopted by your committee, and which have been approved by Mr. Fowler and Dr. Baker of the Chamber of Commerce of the United States, certain general observations should be made.

"The Federal Trade Commission act was enacted by the Senate and House of Representatives on September 26, 1914, for the purpose of creating a Federal Trade Commission; the act defining its power and duties. Senator Cummins in supporting the bill when it was before the Congress stated: 'I predict that in the days to come the Federal Trade Commission and its enforcement of the section with regard to unfair competition will be found an anchor for honest business. I believe it will introduce a stability in business that hitherto has been unknown. I believe it will restore confidence among those who are conducting their affairs honestly and uprightly. I believe it will be found to be the most efficient protection to the people of the United States that Congress has ever given the people by way of regulation of commerce, and that it will rank in future years with the anti-trust law; and I was about to say that it would be found still more efficient in the creation of a code of business ethics and the establishment of the proper sentiments with regard to business morals.'

"While all of the provisions of the act are now in the law of the land, and are of consequent importance, the one with which we are most concerned reads in part as follows:

" 'Section 5. That unfair methods of competition in commerce are hereby declared unlawful. The commission is hereby empowered and directed to prevent persons, partnerships or corporations, except banks, and common carriers subject to the acts to regulate commerce, from using unfair methods of competition in commerce.'

"In the early years of the life of the commission it adopted the so-called stipulation rule. The Federal Trade Commission act provides that in every case of an alleged violation of the statutes the commission shall issue a complaint, publicly cite the respondent and hold a public hearing, all of which is not unnaturally embarrassing to the accused, particularly if he is and found to be innocent of the charge of which complaint is made. By the stipulation rule the commission held that here it deemed it advisable to do so, it might accept the stipulation of the individual accused that he would cease and desist from the unlawful practice, thus permitting him to avoid, if he so desires, the embarrassment and cost of the procedure just described. The authority of the commission to accept such a stipulation lay in its belief that the greater power include the lesser and with a recognition that in this manner a reconciliation between the law and business practice might be effected more simply, expeditiously and less offensively.

"To quote from a recent address before the Chamber of Commerce by the Hon. Abram F. Myers, former member of the Trade Commission: 'The Trade Practice Conference procedure is a logical outgrowth of the stipulation rule. If the commission may stipulate with an individual, why not with an industry? The commission under the statute acts in the public interest in all things; and the public interest cannot be more effectively furthered than by the wholesale exclusion of unlawful and uneconomic practices.'

"Col. Nelson B. Gaskill, also a former member of the Federal Trade Commission, has expressed the opinion that—'The trade association is the greatest agency for the

development of self-government in business which has yet been devised, and the trade conference is the most important and essential element in the development of industrial self-government which has yet made its appearance upon the industrial stage. There is no question whatever in my mind that in the development of the trade conference agreement—a trade practice conference itself—lies the solution of problems which cannot be reached by legislation, and in which the effort to reach a legislative or governmental solution means only the destruction of the self-government principle. . . . As the matter now stands, the trade practice conference has no legal status. There is nothing in the law which authorizes the Federal Trade Commission to call a conference. . . . The fact that it is held under the direction and the guidance of the Federal Trade Commission serves to remove that element of suspicion, of uncertainty, of doubt, which otherwise might lead to a criminal indictment if the trade agreement so reached were found to be in violation of the anti-trust laws.'

"For an industry to voluntarily inform the Federal Trade Commission that it has agreed to refrain from certain illegal or competitive unfair trade practices is not, as has been occasionally erroneously urged by the uninformed, bringing government into business. On the contrary it is emphatically developing the principle of business self-government, and in order that such agreements as are reached may be free from the element of suspicion to which Colonel Gaskill refers they are adopted by and with the advice and consent of the Commission.

"It may be reasonably held as expressed by Mr. Myers that— 'It was the purpose of the act that the commission, taking into account the custom and institutions of business, might gradually build up a body of laws which would in effect give definition to the broad language of the statute.'

Not a Legislative Body

"At present, however, the commission clearly holds that it is not a legislative body; it does not seek or attempt to render unlawful that which is clearly legal merely because of a trade practice agreement; nor does it attempt to enforce any rules adopted by the industry which are not in themselves contrary to the federal statute. The commission does recognize, however, that an industry may willingly agree to rid itself of certain uneconomic and unfair practices which do not specifically offend the law and to such rules and resolutions it gives its tacit consent and approval, and its moral persuasive force without in the least attempting to enforce them at law. It is obvious, therefore, that such rules as may be adopted by an industry for its own self-government must be divided into two groups: The first of which includes those practices which are unlawful, placing in the second group those which are unfair, uneconomic, wasteful and undesirable, yet which have not been held by the courts to be unlawful.

"Your committee has, therefore, classified the rules it has adopted into these two groups, and while the Federal Trade Commission may interchange rules from one group to another, it is believed that the classification herein made will probably be acceptable as offered. Should the board of directors approve the rules as presented by your committee, or accept them with such modification as may be deemed proper, the next step in the procedure would be to petition the Federal Trade Commission to call a trade practice conference of the entire industry. Your committee has already requested the secretary of the commission to tentatively set aside for this purpose the Thursday immediately following the next annual convention pending such action as the board may take at this meeting. If held, the entire day, free from any other convention activities whatever, would be devoted to the trade practice conference, and one of the commissioners would preside.

"Assuming that the industry should adopt the resolutions they would then be submitted to the commission for its further study and subsequent acceptance or modification. If accepted the commission would request all those engaged in our occupation to sign the rules after which they would become effective.

"It would be desirable and certainly feasible for the association through a special committee appointed for that purpose, or through the executive committee, to hear complaints of alleged violation. Should complaint of an alleged violation be made to such a committee the respondent would be so informed, though the name of the complainant would be withheld, and he would then have the opportunity of submitting to the committee such extenuating circumstances as might exist, or entering a denial of the charges. If in the judgment of the committee the alleged violation actually existed and without extenuating circumstances it could request the offender to cease and desist from the practice, and if such assurance was not promptly forthcoming, the committee could lay the complaint and evidence concerning it before the Federal Trade Commission for action. In such an event the entire association would be the complainant, thus relieving any individual producer from the embarrassment of bringing an action against a competitor. It will be observed that in such procedure, far from the government encroaching upon business, the industry is given the opportunity of regulating itself, only appealing to the commission when its own efforts prove futile.

"Your committee recognizes the inadequacy of this report, and would feel impelled to discuss the subject more thoroughly were it not for the fact that supplementary verbal reports will be offered by the members of the committee, with illuminating and explanatory comments by Mr. Fowler and Dr. Baker of the Chamber of Commerce of the United States and Mr. Flannery, secretary of the Federal Trade Commission.

"The rules adopted by the committee and proposed to the board of directors for acceptance are stated below, with a brief comment on each rule immediately thereunder.

Resolutions Probably Classed in Group I

INDUCING BREACH OF CONTRACT

"*Rule 1.* The willful interference by any person, firm, corporation or association, by any means or device whatsoever, with any existing contract or order between a seller and a purchaser, in or about the production, manufacture, transportation, purchase or sale of any product handled by the industry, or the performance of any contractual duty or service connected therewith, such interference being for the purpose or with the effect of dissipating, destroying or appropriating, in whole or in part, the patronage, property or business of another engaged in such industry, is an unfair trade practice.

(NOTE)—Influencing or inducing a person to break his contract with another is of course a legal wrong for which the person injured may recover damages. If the act of persuading another to break his contract is done for the purpose of injuring the competitor's business, or if it has that effect, the act is not merely a legal wrong but it is also an unfair method of competition and within the jurisdiction of the Federal Trade Commission.

In the ordinary case, the rule as quoted has application to attempts by a manufacturer, for example, to persuade customers of his competitor by offering reduced prices or otherwise to break orders already definitely placed and accepted.

MISBRANDING

"*Rule 2.* The marking or branding of products of the industry for the purpose or with the effect of misleading or deceiving purchasers with respect to the quantity, quality, size, grade or substance of the materials purchased, is an unfair trade practice.

(NOTE)—The branding of products in such a way as to deceive or mislead customers, whether this is done purposely or is merely the effect of the branding, is deemed to be an unfair method of competition.

FRAUD AND MISREPRESENTATION

"*Rule 3.* The sale or offering for sale of any product of the industry with intent to deceive customers or prospective customers as to the quantity, quality, size, grade or substance of such product, is an unfair trade practice.

(NOTE)—Any form of misrepresentation, not including misbranding, which is designed to deceive customers is prohibited by this rule. In its present form, it appears that the rule does not extend to cases where the misrepresentation was unintentional. In this respect, the rule is to be distinguished from the preceding rule on misbranding.

SECRET REBATES

"*Rule 4.* The secret prepayment of transportation charges and/or the payment or allowance of secret rebates, refunds, credits, or unearned discounts, whether in the form of money or otherwise, or the giving of premiums, or extending to certain purchasers special service or privileges not extended to all purchasers under like terms and conditions, is an unfair trade practice.

(NOTE)—As a general proposition, it may be considered the policy of the law to place all competitors as nearly as possible on an equal footing. Any practice which has for its purpose the secret preferential treatment of a purchaser clearly destroys the proper equality between competitors.

PRICE DISCRIMINATION

"*Rule 5.* Any discrimination in price between the purchasers of the same class, not including discrimination in price on account of the difference in grade, quality or quantity of the product sold, or which makes only due allowance for difference in cost of selling and transportation, or discrimination in price in the same or different communities not made in good faith to meet competition, where the effect of such discrimination may be to substantially lessen competition or tend to create a monopoly, is an unfair trade practice.

(NOTE)—The present language is a restatement of Section 2 of the Clayton Act. The principle involved is similar to that mentioned in connection with Rule 4—namely, it is in the public interest that, so far as possible, competitors should be placed upon an equal footing.

PRICE DISCRIMINATION

"*Rule 6.* As freight and trucking charges are necessarily reflected in price, and as the variable practice in some instances to requiring purchasers in some instances to pay such charges and in other instances of assuming such charges causes unfair price discrimination, the failure of the seller to require the purchasers in each instance to pay published charges for freight and trucking, is an unfair trade practice.

(NOTE)—Price discrimination may take the form of allowing transportation charges in whole or in part to some customers and not to others. The present rule goes to the extent of saying that where the seller proposes a schedule of charges covering freight and trucking, his failure to adhere to such schedule in every instance operates to discriminate against certain purchasers and in favor of others and is illegal.

DEFAMATION OF COMPETITOR OR DISPARAGEMENT OF HIS MATERIALS

"*Rule 7.* The defamation of a competitor by words or acts, imputing to him dishonorable conduct, inability to perform contracts, or questionable credit standing, or the false disparagement of the grade or quality of his materials, is an unfair trade practice.

(NOTE)—It is generally recognized that fair competition does not permit the circularization of false reports relating to a competitor's products or defamatory statements concerning the competitor himself. This is so recognized by the Federal Trade Commission.

SALES BELOW COST

"*Rule 8.* The selling of goods below cost for the purpose of injuring a competitor and/or with the effect of lessening competition, is an unfair trade practice.

(NOTE)—By a modification of an earlier rule, the commission has sanctioned the statement that selling goods below cost, not to meet competition or to move surplus stocks, but for the purpose of injuring a competitor or of eliminating competition, is an unfair method of competition.

Conversely, it is neither illegal nor an unfair trade practice to sell goods below cost for the purpose of moving surplus stock or to meet competition.

COMMERCIAL BRIBERY

"*Rule 9.* The paying, or promising to pay to an employe of a customer or prospective customer, of a commission or consideration of any character for the purpose of inducing or compensating for a sale, is an unfair trade practice.

(NOTE)—Influencing the judgment of an employe of a customer by the payment of some form of bribe in order to secure business has long been condemned at common law as an interference in the mutual relations between the customer and his employe. This is also unfair as regards competitors under the Federal Trade Commission's interpretation of "unfair competition" as under in the Federal Trade Commission Act.

COMMERCIAL BRIBERY

"*Rule 10.* The offering or giving of commissions, prizes, premiums, gifts or excessive entertainment, as an act of commercial bribery, to anyone in connection with the sale, purchase or use of any product distributed by manufacturers within the industry, or as an inducement thereto, is an unfair trade practice.

(NOTE)—The offense condemned by this rule is the use of special inducements, in no way related to the quality of the product but amounting to preferential treatment to certain customers, to induce sales. Some question may arise as to what is meant by "excessive entertainment." In general, it may be suggested that whether entertainment or gifts are considered "excessive" must necessarily depend upon the facts in each case as they arise. In the application of the rule it is clear that the intent with which the gift is made is in large measure controlling, especially where there is an attempt to interfere with a relationship such as mentioned in connection with the previous rule.

Resolutions Probably Classed in Group II

INDUCING SALES BY OTHER PRODUCTS

"*Rule 11.* The practice of offering a product at a price lower than the competitive market price for that product in the particular locality, as an inducement for the purchase of one or more other products, constitutes discrimination and tends toward the creation of monopoly and the lessening of competition and is an unfair trade practice.

(NOTE)—Although the practice condemned by this rule is usually viewed as unfair by the various industries which have come in contact with it, the objection is probably economic rather than legal. The rule raises a question involved in competition between industries rather than within a single industry. Nevertheless, under the proper showing that the practice would actually have the result of creating a monopoly or lessening competition, it would seem to come within the jurisdiction of the Federal Trade Commission.

"*Rule 12.* The sale of certain products without profit, for the purpose, directly or indirectly, or with the effect of furthering the sale of some other product, constitutes discrimination when it tends toward the creation of monopoly and the lessening of competition, and is an unfair trade practice.

(NOTE)—In this form the rule would seem to follow the principle involved in the rule against selling below cost (Rule 8, above) and may possibly be placed by the commission in Group I. In principle, it would seem unimportant whether the sale condemned by these rules was below the competitive market price or was without profit. In either case, if the act done tended toward the creation of monopoly or the lessening of competition, it would seem to be in violation of the federal anti-trust laws.

ANTI-DUMPING

"*Rule 13.* The practice of certain manufacturers and sellers of shipping quantities of their product into territories outside their particular territories, and of selling such material below the general market prevailing in such other territories into which shipments are made, seriously tends to demoralize the market within the territories into which shipments are made, disrupts normal competitive conditions throughout the entire industry, and is condemned as an unfair trade practice.

(NOTE)—Following the gypsum industry conference, a rule of this character was eliminated by the commission with the statement that the practice condemned came within the rule against price discrimination (similar to Rule 5, above). The dumping of goods in other markets is without doubt a discrimination against customers in the home district, as well as being prejudicial to the interests of competitors in those districts into which the goods are shipped. Even although the practice here condemned is illegal as a violation of Section 2 of the Clayton Act, it may be distinctly helpful to retain a rule on this subject, appropriately worded, in order to call to the attention of members of the industry the illegality of the practice.

ENTICEMENT OF EMPLOYES

"*Rule 14.* The enticement of employes from a competitor for the purpose of interfering with his business is an unfair trade practice.

(NOTE)—This rule does not apply

to the hiring of a single employe from a competitor, nor does it warrant anything in the nature of an agreement among competitors not to employ persons now working for each other. The rule points out that any attempt to injure a competitor's business by hiring away his employe is not a lawful method of competition. As in the case of many of the other rules, the intent with which the act is done is highly significant.

TERMS OF SALE

"Rule 15. The industry hereby records its approval of the practice of establishing definite terms of sale, and the reasonable adherance thereto, and the continued violation by a manufacturer of his terms, for the purpose and with the effect of price discrimination, shall be deemed an unfair trade practice.

(NOTE)—Although it is clear that no one can be compelled to publish the terms under which his products are sold, nevertheless it is the contention of the industry as expressed in this rule that one who publishes terms of sale should see that they are observed. Further, where the terms are enforced as regards some customers and not as to others, and this lack of uniformity in practice results in price discrimination under Section 2 of the Clayton Act, the industry condemns the action as an unfair method of competition."

Extracts From the Report to the Research Committee

A. T. Goldbeck, director of the bureau of engineering and research of the association, reported for the committee in part as follows:

"Since the annual convention in January the work of the laboratory has been confined to the following problems:

"Problem I. What is the influence of coarse aggregate on concrete for highways? This is a continuation of the investigation of coarse aggregates reported at the annual convention. In the previous work the concrete was all proportioned on the basis of 1:2:3½. This resulted in different cement content per cu. yd. for all of the concretes and, in general, the stone concrete proportioned on this basis required roughly 0.4 of a bag more cement than the gravel concrete. The stone concrete, however, gave higher strength results, and the logical step in the investigation was to determine how the strengths would compare when all of the concretes were purposely proportioned so as to have identical cement contents in all cases. Accordingly, the mixtures were designed, partly by calculation and partly by trial batches, to have 6.3 bags per cu. yd. in all cases. The results of this investigation have just appeared in the June, 1929, issue of *The Crushed Stone Journal,* and they are illuminating in showing that with equal cement contents, stone concrete seems to have an advantage in cross-breaking strengths over the gravel concretes, although in some cases it gives lower compressive strength than the gravel concretes.

"The next step in this same investigation will be to determine the proportions necessary to give equal cross-bending strengths in all cases. This will be one of the steps necessary in developing a method of designing concrete for a given cross-bending strength if this is feasible.

"In continuation of this project, investigations are also being made on blast furnace slag, on samples submitted in connection with committee work of the American Society for Testing Materials and involving light, meduim and heavy slags.

Effect of Gradation on Concrete

"Problem II. What is the influence of gradation on various properties of concrete? The influence of gradation on percentage of voids has already been reported. The next question that arises is, What gradations of coarse aggregate may be considered the most practicable and most economical from the standpoint of their giving the highest strengths of concrete with a minimum cement content and at the same time will be economical to produce by the average crushed-stone plant. Preliminary work along this line has been completed and reported in the April, 1929, issue of *The Crushed Stone Journal,* 'The Effect of Variations of Crushed Stone on Concrete Strength.' Here it was shown that quite wide variation in gradation, particularly on the intermediate sizes, may be used with not very much effect on percentage of voids or on strength values. Apparently an entire lack of intermediate sizes reduces somewhat the compressive strength of the concrete.

"Problem III. To what extent are deleterious substances in coarse aggregates harmful to the concrete? Investigations on the effect of stone dust have already been reported. During the present six months' period investigations have likewise been conducted at the request of some of the producers on the effect of oil impregnation on the concrete-making properties of a limestone aggregate. This investigation was included among the investigations of deleterious substances and has been reported as a portion of the report of the concrete aggregates committee of the A. S. T. M.

"Problem IV. What is the effect of coarse aggregate on resistance of concrete to repeated loads? Although no work has been done directly in our laboratory on this subject, through our efforts a very elaborate repeated load testing machine has been built at Cornell University after our suggested design and is in very successful operation. It is believed that results may be expected from Cornell University at some future time.

"Problem V. How should the water-ratio theory be revised to meet the needs of cross-bending? The results of work on Problem I will become available during the present year for partially answering the above.

"Problem VI. What characteristics should stone-sand have for use as a fine aggregate in concrete? A lot of preliminary work has been done on this investigation, involving the preparation of a large quantity of stone-sand by crushing and grinding and screening out to a number of different sizes. Preliminary strength tests have also been made by the use of small mortar specimens, and the next step will be to make up concrete with various gradations of stone-sand and in comparison therewith natural sand will be similarly graded for use in concrete. Strength tests will be made using beams and cylinders.

Studies on Soundness of Rock

"In addition to the above problems, considerable work has been done on accelerated tests for determining the soundness of rock. One rather elaborate investigation has been performed for the committee on filtering materials of the Division of Sanitary Engineering of the A. S. C. E. The object of this co-operative test was to study the suitability of the sodium sulphate test as a means for determining the soundness of rock and other materials. Elaborate sodium phosphate tests were made on both stone and slag samples. Freezing and thawing tests were also conducted for comparison purposes. Although a copy of our report on this investigation is not attached hereto because of the co-operative character of the investigation, the report is available for inspection by the research committee.

"Still another co-operative investigation on the sodium sulphate test has been conducted in co-operation with the U. S. Bureau of Public Roads and other laboratories on samples of rock submitted by the bureau. All this co-operative work should finally lead to the formulation of a suitable method for determining the soundness of rock. It is a fact that at the present time, because of the variations in the method practiced and possible under the present description of the sodium phosphate test, some laboratories may reject while others may accept a coarse aggregate tested in this manner.

"In connection with the accelerated tests we have likewise conducted a series of comparison tests on various coarse aggregates with the freezing and thawing apparatus as well as with the sodium sulphate method. and the results will be presented very shortly in a coming article in the *Journal.* These results are very interesting in showing:

"(1) That the sodium sulphate test may reject perfectly sound material.

"(2) That it may not detect unsoundness of material which fails in the freezing and thawing test.

"(3) That unsoundness of concrete may often be due to the effect of freezing and thawing of the mortar rather than on the coarse aggregate.

"This investigation will be presented in considerable detail, fully illustrated.

Bituminous Investigations

"Thus far the laboratory has not been

equipped for making bituminous investigations, and undoubtedly some valuable work could and should be done along this line. The secondary road, particularly the mixed-in-place surface, the bituminous concrete, and likewise various forms of surface treatments, can be investigated with profit in the laboratory. The problem of highest importance is to produce mixtures having the greatest stability under the action of traffic, and the laboratory procedure would involve tests to determine how high stability may best be obtained.

"Questions concerning the effect of various forms of dusts used as fillers should likewise be investigated. This is a very active problem where ground glass dust is in competition with limestone.

Conclusion

It will be realized by the research committee that our laboratory personnel, consisting of one laboratory engineer with two assistants, is extremely limited, and in view of the desirability of obtaining indications on some of the problems as rapidly as possible, we have not been able to make our tests elaborate and sufficiently complete to obtain final answers to the questions involved. But we have been able to obtain some very strong indications, and this form of investigational work is useful in showing the way to other laboratories having a particular interest along certain lines. Moreover, the strong indications obtained enable us to speak with much more authority than would be possible in discussing questions or changes in specifications with state highway authorities."

Representative Attendance

The attendance at the meeting was one of the largest ever. W. F. Wise, president of the association, ably presented a picture of its status, its needs, and its accomplishments. The following directors were present:

W. F. Wise, chairman, Dallas, Tex.
W. M. Andrews, Youngstown, Ohio.
H. E. Bair, Toledo, Ohio.
J. E. Cushing, Schenectady, N. Y.
C. M. Doolittle, Hamilton, Ont.
F. O. Earnshaw, Youngstown, Ohio.
E. Eikel, New Braunfels, Tex.
E. E. Evans, Toledo, Ohio.
Otho M. Graves, Easton, Penn.
F. T. Gucker, Norristown, Penn.
J. L. Heimlich, Le Roy, N. Y.
W. E. Hilliard, New Haven, Conn.
A. S. Lane, Meriden, Conn.
Thomas McCroskey, Knoxville, Tenn.
Russell Rarey, Columbus, Ohio.
John Rice, Easton, Penn.
H. E. Rodes, Nashville, Tenn.
James Savage, Buffalo, N. Y.
F. W. Schmidt, Morristown, N. J.
W. L. Sporborg, Syracuse, N. Y.
R. B. Tyler, Louisville, Ky.
T. I. Weston, Columbus, S. C.
A. L. Worthen, New Haven, Conn.
E. G. Lewis, New York City.
C. B. Andrews, High Bridge, N. J.
H. M. Davison, New York City.

Diesel Engine Manufacturers Organize Association

TWELVE of the leading builders, representing practically the entire output of Diesel engines in the United States, have organized the Diesel Engine Manufacturers Association. The association has as its primary object the advancement of Diesel power in America.

The following manufacturers are members of the association: New London Ship and Engine Works, Electric Boat Co., Worthington Pump and Machinery Corp., Fulton Iron Works Co., Ingersoll-Rand Co., Fairbanks, Morse and Co., Nordberg Manufacturing Co., I. P. Morris and DeLaVergne, Inc., Winton Engine Co., Cooper-Bessemer Corp., McIntosh and Seymour Corp., Busch-Sulzer Bros. Diesel Engine Co. and Hooven, Owens, Rentschler Co.

The president of the association is Henry R. Sutphen, president, Electric Boat Co.; E. T. Fishwick, vice-president of the Worthington Pump and Machinery Corp., is vice-president of the association, and Harlan A. Pratt, manager, oil and gas engine department of Ingersoll-Rand Co., is secretary and treasurer. The association also employs M. J. Reed as research engineer, with headquarters at the association office, 30 Church street, New York City.

Group Progress and the Business Press

(An Editorial in Iron Age)

INDIVIDUALISM in industry is steadily giving way to group effort. Time was when every manufacturer regarded competitors with suspicion and jealously guarded his secrets from prying eyes. In his self-esteem he did not credit others with the ability to develop equally good ideas. Today the same self-confidence helps to explain a radical change in attitude. A keen foreign observer recently quoted an American foundryman as follows: "Why shouldn't I let a competitor visit my plant? If I do not learn more from him than he gets from me, I am to blame."

The old saying that "two heads are better than one" finally is being taken seriously. There is a constant pooling of ideas both in informal conferences and in the meetings of organized associations. It is realized that there are mutual advantages in a policy of give and take; it is clearly seen that progress is expedited if many minds work collectively for the solution of business problems. Yet it is only beginning to dawn on some that the group mind of an industry functions most effectively in the business paper.

Such a publication is not merely a newspaper. It collects the diverse ideas of many individuals, and sifts, assembles and organizes them, returning them to industry in the most usable form.

There may be journals that head an industry and others that follow it, but the trade publication is of greatest value as the best available means for collective expression. An industry serves the common welfare and thus justifies its existence only as it learns more, and makes practical use of what it learns, about its technical and economic problems. The business paper, in both its advertising and editorial pages, is a stimulus to all to contribute to, as well as to partake of, the latest, best conceived and most useful ideas of their industry.

Canada Cement Installs 374-Ft. Kiln at Hull Plant

THE new rotary kiln installed by the Canada Cement Co. at its Hull, Quebec, plant is said to be the largest kiln of this type in America. Measuring 374 ft. in over-all length, the new kiln has a diameter tapering from 11 ft. 3 in. to 10 ft., and a rated capacity of 2400 bbl. daily. This is the second installation of a wet process plant by the company, the first unit to be changed over being the Fort Whyte plant in Manitoba, which was converted a year ago. A complete description of this plant will appear in an early issue.

Better control of the process and economy through the elimination of drying raw materials are given as the principal reasons for making the change.

Industry Develops Three New Simplification Programs

THREE additional simplified practice recommendations were developed by industry during the second quarter of this year, bringing the total for the fiscal year to 12, observes Ray M. Hudson, assistant director of the Bureau of Standards in charge of the commercial standardization group, in his report to Dr. George K. Burgess, director of the bureau.

"The various industries," said Mr. Hudson, "in cooperation with the division of simplified practice of the bureau, have now developed a total of 98 recommendations. Fourteen simplified practice recommendations and one regional recommendation are now in process of acceptance."

"Quickard" a New High Early Strength Cement

THE PHYSICAL characeristics of "Quikard," the high early strength cement manufactured by the Ash Grove Lime and Portland Cement Co., have been compiled and published by the company in an attractive illustrated bulletin. Illustrations of the many places where "Quikard" may be used with advantage are given and some special specifications governing high early strength cements in general.

Editorial Comment

An Aid to Our Conscience

We commend to all crushed-stone producers a thorough study of the code of business or trade practice drawn up by the trade practice committee of the National Crushed Stone Association, under the able chairmanship of Otho M. Graves, published elsewhere in this issue. This code has been approved by the board of directors of the association and will be presented to the industry at its January, 1930, convention for revision, approval and adoption. It will become the accepted code of the entire industry if approved and accepted and subscribed to at a trade practice conference of the industry, held at the call of and under the auspices of the Federal Trade Commission.

Many other industries will have preceded the crushed-stone industry in the adoption of such a code. Many others will follow. In the rock products industry, the gypsum and lime industries have already adopted codes. Probably not many industries with such a large number of producers, with such generally local interests, as the crushed-stone quarry industry, have yet adopted codes. This makes the problem of improving business practice somewhat more difficult because it is quite essential for its real success that a substantial majority of producers understand and approve such a code.

Actually the Federal Trade Commission is not so much interested in whether a majority of *producers* recognize the code, as it is in whether a major part of the *production* is represented by those who subscribe. Probably about 250 producing companies supply nearly 75% of the commercial crushed stone sold in the United States. But there are at least 1000 producers. It is therefore important to the 750 producers who supply the remaining 25% of the commercial crushed stone to know about, to understand and to act upon the code, not so much for the benefit of the industry at large, as for their own benefit and protection. The code can be legally adopted without their knowledge and consent.

The question then naturally arises, what does the signing and the adoption of the code mean? One thing it does not mean is that business practices will be revolutionized overnight. Practically all it does mean is that there will henceforth be an organized effort to improve business morality.

Every one familiar with business knows that during the last twenty years or more there have been tremendous strides made in this country toward a higher standard of business morality and business ethics. All business and a great majority of business men have profited by it. That it is a real though an intangible factor in our present long continued era of general prosperity can not be doubted. It is part of the evolution of modern business, which has caused business men to consider trade as something other than merely individual enterprise for purely selfish individual profit, and to look upon it more and more as a phase of public service. Fair profit is a necessary and unenvied return for public service.

The time has come when this conception of business is so generally accepted that business men in groups representing various industries and trades now gather together and draw up rules which specifically name the unmoral, unethical, unfair practices which, with this enlightened view of business, should henceforth cease; and with the help of an arm of the federal government, they are making an organized effort to see that business is conducted as every honest and intelligent man is beginning to believe it should be conducted.

The day of the individual business hog is gone. He will no longer be tolerated by his associates in business; and the public has long since learned to detest him. The opportunities to build private fortunes are in no degree lessened. In fact they are greater than ever. But the methods of achieving such fortunes in trade and business have changed. They will come to individuals through industries that in the opinion of the public render maximum public service—and public service in trade and business now means many things once considered outside "clever" conduct of business.

Many of the restrictions in such codes of business practice that members of an industry "voluntarily" subscribe to are plain, downright violations of the law, of which they have perhaps been in blissful ignorance, but which nevertheless they can be compelled to obey by the ordinary processes of law enforcement. The other things prohibited are practices which the great majority of honorable and enlightened business men have come to regard as not only unsound and uneconomical, but in many cases unmoral and therefore contrary to the best interests of business in general.

An industry, such as the commercial-stone quarry industry, may be among the first, or it may be among the last, business or industry to accept this conception of business; but sooner or later it will have to accept it because those who look forward see that it is obvious that such a conception of business is becoming general.

Of course, subscribing to a code of business practice will not bring about this change, any more than subscribing to a church creed makes us Christians. But knowledge that the new approved methods of doing business are the best methods of our individual success will eventually bring the code, or such parts of it as prove by test and experience to be sound, into practically universal usage. And the best feature of such a code is that it will help us keep our consciences, which some old-fashioned methods of business had a tendency to destroy.

Financial News and Comment

RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS

Stock	Date	Bid	Asked	Dividend
Allentown P. C. 1st 6's[29]	7-16-29	90	.....	
Alpha P. C. new com.	7-29-29	43	44½	75c qu. July 15
Alpha P. C. pfd.	7-27-29	116	.....	1.75 June 15
American Aggregates com.[29]	7-16-29	.....	44	75c qu. Mar. 1
Amer. Aggregate 6's, bonds	7-16-29	98	.....	
American Brick Co., sand-lime brick	7-29-29	14	17	26c qu. Feb. 1
American Brick Co. pfd., sand-lime brick	6-28-29	.....	82	50c qu. Feb. 1
Am. L. & S. 1st 7's[29]	7-16-29	99	100	
American Silica Corp. 6½'s[49]	7-31-29	96	100	
Arundel Corp. new com.	7-29-29	41	41⅜	50c qu. July 1
Atlantic Gyp. Prod. (1st 6's & 10 sh. com.)[10]	7-31-29	No market		
Atlas P. C. com.	7-29-29	48	49½	50c qu. June 1
Beaver P. C. 1st 7's[29]	7-27-29	98	100	
Bessemer L. & C. Class A	7-30-29	35	45	75c. qu. Aug. 1
Bessemer L. & C. 1st 6½'s[4]	7-26-29	95	97	
Bloomington Limestone 6's[29]	7-16-29	92	95	
Boston S. & G. new com.[18]	7-26-29	19	22	40c qu. July 1
Boston S. & G. new 7% pfd.[16]	7-26-29	48	52	87½c qu. July 1
Canada Cement com.	7-29-29	26	.....	
Canada Cement pfd.	7-29-29	97	.....	1.62½ qu. June 29
Canada Cement 5½'s[11]	7-26-29	98½	99	
Canada Cr. St. Corp. 1st 6½'s[32]	7-25-29	97	100	
Canada Gyp. & Alabastine	7-29-29	118¼	119¼	75c July 2
Certainteed Prod. com.	7-30-29	30½	32	
Certainteed Prod. pfd.	7-30-29	70	70	1.75 qu. Jan. 1
Cleveland Quarries new st'k	7-30-29	.....	70	50c Sept. 1
Columbia S. & G. pfd.	7-29-29	86	91	
Consol. Cement 1st 6½'s, A[42]	7-31-29	90	92	
Consol. Cement 6½% notes[29]	7-16-29	85	90	
Consol. Cement pfd.[29]	7-16-29	50	60	
Consol. Oka S. & G. 6½'s[12] (Canada)	7-12-29	101	102	
Consol. Rock Prods. com.[20]	7-27-29	8	10	
Consol. Rock Prods. pfd.[20]	7-27-29	20	25	
Consol. Rock Prods. units[20]	7-27-29	52	53	
Consol. S. & G. com. (Can.)[43]	7-26-29	No market		
Consol. S. & G. pfd. (Can.)[11]	7-26-29	90	92	1.75 qu. Aug. 15
Construction Mat. com.	7-29-29	26	27	
Construction Mat. pfd.	7-29-29	43	43½	87½c qu. Aug. 1
Consumers Rock & Gravel, 1st Mtg. 6's, 1948[18]	7-27-29	94	97	
Coosa P. C. 1st 6's[29]	7-16-29	50	55	
Coplay Cem. Mfg. 1st 6's[40]	7-26-29	90	.....	
Coplay Cem. Mfg. com.[40]	7-26-29	10	.....	
Coplay Cem. Mfg. pfd.[40]	7-26-29	70	.....	
Dewey P. C. 6's[30] (1930-41)	7-31-29	97	.....	
Dewey P. C. 6's[30] (1942)	7-31-29	96	.....	
Dolese & Shepard	7-30-29	100	.....	$2 qu. July 1
Edison P. C. com.[39]	7-26-29	10	.....	
Edison P. C. pfd.[39]	7-26-29	25	.....	
Giant P. C. com.[25]	7-26-29	35	40	
Giant P. C. pfd.[25]	7-26-29	34	40	3½% s.-a. June 15
Ideal Cement, new com.[23]	7-29-29	74	76	75c qu. July 1
Ideal Cement 5's, 1943[33]	7-29-29	100	102	
Indiana Limestone units[29] (5 shs. com. & 1 sh. pfd.)	7-16-29	.....	105	
Indiana Limestone 6's	7-15-29	87	87½	
International Cem. com.	7-29-29	77½	79	$1 qu. June 28
International Cem. bonds 5's	7-29-29	104½	105	Semi-ann. int.
Iron City S. & G. bonds 6's[46]	7-26-29	92	95	
Kelley Is. L. & T. new st'k	7-30-29	50	50	62½c. qu. July 1
Ky. Cons. St. com. Voting Trust Certif.[48]	7-25-29	13	14	
Ky. Cons. Stone 6½'s*[48]	7-25-29	96	100	
Ky. Cons. Stone com.	7-30-29	.....	14	
Ky. Cons. St. Trustee Certif. (1 Sh. 7% cum. pfd. & 1 sh. com. stock)	7-30-29	98	.....	
Lawrence P. C.	7-29-29	85	90	2% qu. June 29
Lawrence P. C. 5½'s, 1942	7- 3-29	87	92	
Lehigh P. C.	7-29-29	46	49	62½c qu. Aug. 1
Lehigh P. C. pfd.	7-29-29	109⅝	109¾	1¾% qu. July 1
Louisville Cement	7-15-29	250	.....	
Lyman-Richey 1st 6's, 1932[13]	7-26-29	98	100	
Lyman-Richey 1st 6's, 1935[13]	7-26-29	96½	99	
Marblehead Lime 6's[14]	7-26-29	98	100	
Material Service Corp.	7-29-29	29	30	50c qu. Aug. 15
Medusa Portland Cem.[29]	7-16-29	120	125	1.50 July 1
Mich. L. & C. com.[6]	7-26-29	35	.....	
Missouri P. C.	7-27-29	43	43¼	50c qu. Aug. 1
Monolith Midwest[9]	7-26-29	8½	10	
Monolith bonds, 6's[9]	7-26-29	97	98	
Monolith P. C. com.[9]	7-26-29	14	14½	40c s.-a. July 1
Monolith P. C. pfd.[9]	7-26-29	9	9½	40c s.-a. July 1
Monolith P. C. units[9]	7-26-29	32	33½	
National Cem. (Can.) 1st 7's[33]	6-17-29	96	.....	
National Gypsum A com.	7-30-29	15	17	
National Gypsum pfd.	7-30-28	54	58	
Nazareth Cem. com.[26]	7-26-29	25	29	
Nazareth Cem. pfd.[26]	7-26-29	100	105	
Newaygo P. C. 1st 6½'s[29]	7-16-29	102	.....	
New Eng. Lime 1st 6's[14]	7-26-29	98	100	
N. Y. Trap Rock 1st 6's	7-29-29	97	97	
North Amer. Cem. 1st 6½'s	7-27-29	70¾	70¾	
North Amer. Cem. com.[20]	7-29-29	9	10⅛	
North Amer. Cem. 7% pfd.[22]	7-12-29	32	42	1.75 qu. Aug. 1
North Amer. Cem. units[29]	7-16-29	30	40	
North Shore Mat. 1st 5's[15]	7-31-29	95	.....	
Northwestern States P. C.[37]	7-26-29	140	.....	
Ohio River Sand com.	7-30-29	28½	30	
Ohio River Sand 7% pfd.	7-30-29	101	102	
Ohio River S. & G. 6's[16]	7-26-20	92	95	
Pac. Coast Cem. 6's, A[5]	7-25-29	.....	95	
Pacific Lime Co. pfd.[11]	7-26-29	No market		
Pacific P. C. com.	7-26-29	24	25	
Pacific P. C. pfd.	7-26-20	80	83	1.62½ qu. July 5
Pacific P. C. 6's[5]	7-25-29	99¼	100	
Peerless Egyp'n P. C. com.[21]	7-26-29	2¼	3¼	
Peerless Egyp'n P. C. pfd.[21]	7-26-29	85	90	1.75 July 1
Penn-Dixie Cem. 1st 6's	7-29-27	83½	83½	
Penn-Dixie Cem. pfd.	7-29-29	70⅓	70½	1.75 qu. June 15
Penn-Dixie Cem. com.	7-29-29	13¾	13	
Penn. Glass Sand Corp. 6's†	7- 3-29	99	101	
Penn. Glass Sand pfd.	7- 3-29	108	.....	
Petoskey P. C.	8- 1-29	.....	10¾	1½% qu.
Riverside P. C. com.	7-26-29	18	.....	
Riverside P. C. pfd.[20]	7-27-29	92	94	1.50 qu. Aug. 1
Riverside P. C., A[9]	7-27-29	18	20	31¼c qu. Aug. 1
Riverside P. C., B[20]	7-27-29	1	2	
Santa Cruz P. C. 1st 6's, 1945[5]	7-25-29	105¾	106¼	6% annual
Santa Cruz P. C. com.	7-26-29	90	99	$1 qu. July 1
Schumacher Wallboard com.	7-26-29	14	14	
Schumacher Wallboard pfd.	7-26-29	25	26½	
Southwestern P. C. units[44]	7-25-29	270	.....	
Standard Paving & Mat. (Can.) com.	7-29-29	34	35	50c qu. May 15
Standard Pav. & Mat. pfd.	7-29-29	96¾	98	1.75 qu. May 15
Superior P. C., A[20]	7-27-29	43	44	27½c mo. Aug. 1
Superior P. C., B[20]	7-27-29	23½	25½	
Trinity P. C. units[37]	7-26-29	142	150	
Trinity P. C. com.[37]	7-26-29	51	.....	
Trinity P. C. pfd.[29]	7-16-29	100	110	
U. S. Gypsum com.	7-29-29	69½	70	2% qu. June 30
U. S. Gypsum pt. paid	7-29-29	62	64	
U. S. Gypsum pfd.	7-16-29	124	124	1¾% qu. June 30
Universal G. & L. com.[3]	7-31-29	.....	1	
Universal G. & L. pfd.[3]	7-31-29	8	10	
Universal G. & L., V.T.C.[3]	7-31-29	No market		
Universal G. & L. 1st 6's[3]	7-31-29	60	.....	
Warner Co. com.[16]	7-26-29	39	45	50c qu. July 15
Warner Co. 1st 7% pfd.[16]	7-26-29	97	100	1¾% qu. July 1
Warner Co. 1st 6's[8]	7-31-29	98¾	99	
Whitehall Cem. Mfg. com.[36]	7-30-29	125	.....	
Whitehall Cem. Mfg. pfd.[30]	7-30-29	50	.....	
Wisconsin L. & C. 1st 6's[15]	7-16-29	No market		
Wolverine P. C. com.	7-29-29	5	7	15c qu. Aug. 15
Yosemite P. C., A com.[44]	7-25-29	4¼	5	

*Ann. interest due May and Nov. 1. Semi-ann. coupon of $32.50 paid Nov. 1. †Called for redemption at 105, July 1.

[1]Quotations by Watling Lerchen & Hayes Co., Detroit, Mich. [2]Quotations by Bristol & Willett, New York. [3]Quotations by Rogers, Tracy Co., Chicago. [4]Quotations by Butler Beadling & Co., Youngstown, Ohio. [5]Quotations by Freeman, Smith & Camp Co., San Francisco, Calif. [6]Quotations by Frederic H. Hatch & Co., New York. [7]Quotations by F. M. Zeiler & Co., Chicago, Ill. [8]Quotations by Dillon, Read & Co., Chicago, Ill. [9]Quotations by A. E. White Co., San Francisco, Calif. [10]Quotations by Lee Higginson & Co., Boston and Chicago. [11]Nesbit, Thomson & Co., Montreal, Canada. [12]James Richardson & Sons, Ltd., Winnipeg, Man. [13]Peters Trust Co., Omaha, Neb. [14]First Wisconsin Co., Milwaukee, Wis. [15]Central Trust Co., of Illinois, Chicago. [16]J. S. Wilson, Jr., Co., Baltimore, Md. [17]Chas. W. Scranton & Co., New Haven, Conn. [18]Dean, Witter & Co., Los Angeles, Calif. [19]Hoit, Rose & Troster, New York. [20]Quotations by Bond & Goodwin & Tucker, Inc., San Francisco. [21]Baker, Simonds & Co., Inc., Detroit. [22]Hemphill, Noyes & Co., New York City, N. Y. [23]Blair & Co., New York and Chicago. [24]A. B. Leach & Co., Inc., Chicago. [25]Richards & Co., Philadelphia, Penn. [26]Hincks Bros. & Co., Bridgeport, Conn. [27]J. G. White & Co., New York. [28]Mitchell-Hutchins Co., Chicago, Ill. [29]National City Co., Chicago, Ill. [30]Chicago Trust Co., Chicago. [31]McIntyre & Co., New York, N. Y. [32]A. E. Ames & Co., Toronto, Can. [33]Boettcher Newton & Co., Denver, Colo. [34]Kidder, Peabody & Co., Boston, Mass. [35]Farnum, Winter & Co., Chicago. [36]Hanson and Hanson, New York. [37]S. F. Holzinger & Co., Milwaukee, Wis. [38]McFetrick & Co., Montreal Que. [39]Tobey and Kirk, New York. [40]Steiner, Rouse and Stroock, New York. [41]Hornblower & Weeks, New York City and Chicago. [42]E. H. Rollins, Chicago, Ill. [43]Jones, Heward & Co., Montreal, Que. [44]Tenney, Williams & Co., Inc., Los Angeles, Calif. [45]Taylor Ewart & Co. [46]Stein Bros. & Boyce, Baltimore, Md. [47]Bank of Pittsburgh, Pittsburgh, Pa. [48]E. W. Hays & Co., Louisville, Ky. [49]Blythe Witter & Co.

INACTIVE ROCK PRODUCTS SECURITIES (Latest Available Quotations)

Stock	Price bid	Price asked
American Brick Co. pfd. (sand-lime brick) 13 sh.[6]	par 25	24
American Brick Co. pfd., 5 sh.[2] (par 25)	25	.....
Atlantic Gypsum Products[6] com., 200 shares	$2 per share	.....
International Portland Cement Co., Ltd., pfd.	30	45
Seaboard P. C.[1] 6% bonds ($7,500) 7-1-27. July, 1910, and subsequent coupons attached	$10 for the lot	.....
Southern Phosphate Co.[6]	1¼	.....
Universal Gypsum com. free stk.[1] 300 shares	$75 for the lot	.....
Universal Gypsum com.[1] 153 shares (no par)	$51 for the lot	.....
Vermont Milling Products Co. (slate granules), 22 sh. com. and 12 sh. pfd.[6]	$1 for the lot	.....
Winchester Brick Co., pfd., sand lime brick[5]	10c	.....
Winchester Rock Brick Co., pfd., 1 share (par $25) and 1 share com. (par $10)[6]	$8 for the lot	.....

[1]Price obtained at auction by Adrian H. Muller & Sons, New York. [2]Price at auction by R. L. Day & Co., April 24, 1929. [5]Price obtained at auction for lot of 50 shares by R. L. Day & Co., Boston, Mass. [6]Price obtained at auction by Wise Hobbs and Arnold, Boston, Mass., June 19, 1929.

Pacific Coast Aggregates, Inc., Bonds and Debentures Offered

CALIFORNIA CO., Los Angeles, are offering $4,000,000 first mortgage 6½% sinking fund gold bonds and $1,500,000, 7%, 10-year convertible gold debentures of the recently organized Pacific Coast Aggregates, Inc.

The following is taken from a letter of Norman B. Livermore, president of the company:

BUSINESS AND PROPERTIES—Pacific Coast Aggregates, Inc., is being organized under the laws of the state of California for the purpose of acquiring the business and properties of Rhodes-Jamieson Co., Associated Gravel Co. and Acme Gravel Co., Pratt Rock and Gravel Co. and Pratt Building Material Co. with subsidiaries, Bay Development Co. with subsidiary, Santa Clara Gravel Co., G. and M. Gravel Co., T. I. Butler Co., Inc., California Building Material Co., Piedra Rock Co. and California Rock Co., constituting a substantial majority of the important producers and distributors in central California of sand and gravel, which are staple basic commodities used in large quantities in the construction and maintenance of public highways and railroads and in all general concrete work.

These companies, some of which have been in business for over 20 years, operate 20 plants producing sand, gravel and crushed stone and 25 distributing bunkers strategically located for serving an important and fast growing territory. Delivery is effected with 97 motor trucks, 18 barges and seven tugs.

The sand, gravel and rock deposits being acquired consist of 2356 acres owned in fee, and 1113 acres controlled under lease estimated sufficient to meet the corporation's requirements for over 50 years at the present rate of production. The corporation's reserves constitute a substantial majority of the known commercial deposits in the territory to be served. Gravel deposits approximate 60% gravel and 40% sand, representing about the proportion required in the manufacture of concrete, thereby permitting low cost production.

The producing and distributing plants will permit the economical production and handling of sand, gravel and crushed stone and are so situated as to benefit by low transportation costs, an item extremely important in this business, and giving the corporation distinct competitive advantages. With the available distributing facilities the corporation will increase the retail distribution of general building materials.

MARKET—Pacific Coast Aggregates, Inc., will become the largest producer and distributor of sand and gravel in central California, the territory comprising the cities of San Francisco, Oakland, Sacramento, Berkeley, San Jose, Stockton, Alameda, Richmond and many smaller communities. It is estimated that the territory to be served contains approximately one-half of the population of California, and represents one of the fastest growing sections of the United States. The building and maintenance of concrete highways in California has been stimulated and stabilized by the enactment of a gasoline tax. An increasing demand for aggregates for use in the construction of buildings, bridges, sewers, harbor improvements, tunnels, water and reclamation projects and other purposes is expected, and as a result of these factors the corporation should enjoy a sustained and growing demand for its products.

Indicating the increasing demand for aggregates, the following table shows by five-year periods for the past 15 years the value of building permits issued by the principal cities of the territory to be served by Pacific Coast Aggregates, Inc.:

Period	Total value of building permits for period	Annual average
1914 through 1918	$146,191,594	$ 29,262,618
1919 through 1923	370,804,022	86,383,816
1924 through 1928	593,399,748	118,679,948

EARNINGS—Consolidated net income for the five years ended December 1, 1927, of the predecessor companies, available for interest but before depreciation, depletion and federal income taxes, with adjustments (averaging $356,705 per annum) for non-recurring items and reduction of salaries and certain other estimated savings under consolidation, as certified by Messrs. Haskins and Sells, were as follows:

Year ended 1923	$1,116,927
Year ended 1924	1,101,369
Year ended 1925	1,276,021
Year ended 1926	1,179,909
Year ended 1927	1,209,222

The annual average earnings of the predecessor companies of $1,290,384.14 for the above period are equivalent to over 4.4 times annual interest requirements on the issue of first mortgage bonds and after deducting these and prior charges are equivalent to over eight times the annual requirements of the debenture issue.

For the year 1928 similar earnings certified by Messrs. Haskins and Sells were $787,974 90. The decrease shown in 1928 is the result of abnormal conditions which will be eliminated by the formation of Pacific Coast Aggregates, Inc.

As a result of the benefits to be derived from the consolidation of the various businesses under single management, the management estimates average annual earnings for the first five years of operation of $1,972,000 available for interest but before depreciation, depletion and federal taxes equal to approximately six times interest on these first mortgage bonds and equivalent after all deductions to $2.55 per share of common stock to be presently oustanding. These estimates have been checked by Ford, Bacon and Davis, Inc., and found to be conservative.

CAPITALIZATION—The capitalization of the Pacific Coast Aggregates, Inc., on completion of the acquisition of the properties and business mentioned above and the financing incident thereto will be as follows:

	Authorized	Presently to be outstanding
First mortgage 6½% gold bonds	$4,500,000	$4,000,000
10-year 7% convertible gold debentures	1,500,000	1,500,000
Convertible preferred stock (no par value), shares	.....	154,993
Common stock (no par)*, shares	443,000	219,500

*Sufficient common stock will be reserved for conversion of 10-year debentures and convertible preferred stock.

SECURITY AND ASSETS—The bonds will be direct obligations of the Pacific Coast Aggregates, Inc., and will be secured by a closed first mortgage on all of the fixed assets being acquired from the predecessor companies. Ford, Bacon and Davis, Inc., engineers, value the properties being acquired at $18,713,047, which is in excess of $4100 for each $1000 bond of the issue. After deducting $4,500,000, the amount represented by the first mortgage bonds, there remains $14,213,047 in assets or in excess of $8000 for each $1000 debenture of this issue. As the result of this and other financing the corporation will be placed in a strong net current position.

SINKING AND DEPLETION FUNDS—The indenture securing the issue of bonds will provide for a sinking fund of $100,000 every six months commencing on January 1, 1931, and continuing on the first day of January and July of each year to and including January 1, 1935, and a sinking fund of $150,000 every six months commencing on July 1, 1935, and continuing on the first day of January and July of each year of the life of said bonds and until the maturity thereof. Said sinking fund shall be payable monthly to the trustee at the rate of one-sixth of the semi-annual sinking fund requirements, such monthly payments to commence on July 1, 1930. This sinking fund shall be available for the purchase of bonds in the open market at prices below the call price or for the call of bonds by lot. The bonds shall be subject to call upon 45 days' published notice at 105 and accrued interest during the first five years and ½ of 1% less for each year of the succeeding 10 years, but in no event at less than 101 and interest. The indenture securing the issue of debentures will provide for a sinking fund of $150,000 per year, commencing July 1, 1930, $200,000 per year commencing July 1, 1935, $240,000 per year commencing July 1, 1936, and $280,000 per year commencing July 1, 1937, and continuing until maturity. Such sinking fund payments shall be payable to the trustee monthly in advance commencing July 1, 1930, at the rate of one-twelfth of the next succeeding annual installment thereof. This sinking fund shall be available for the purchase of debentures in the open market at prices below the call price, or for the call of debentures by lot. The debentures shall be subject to call upon 45 days' published notice at 105 and accrued interest, the fixed maturity date of said debentures to be deemed a date of redemption so that on July 1, 1939, there shall be paid to the holders of said debentures a premium of 5% in addition to the face amount thereof.

The corporation will also provide from earnings a depletion fund in addition to its annual deduction for depletion allowable in making federal tax returns, equivalent to not less than 5 cents per ton of sand, gravel or stone sold by it during the immediately preceding three months which shall be set aside and shall not be available for dividends.

PURPOSE OF FINANCING—The proceeds from these bonds and from $1,750,000 of 10-year 7% convertible gold debentures will be used in connection with the acquisition of the physical assets and businesses of the precedessor companies to supply working capital and for general corporate purposes.

GENERAL—The management of the business will continue in the hands of persons who have demonstrated their ability to manage successfully a business of this nature. They have long been identified with some of the business being acquired and will own a large amount of securities junior to this issue of bonds. To insure continuity of management all the outstanding common stock of the company will be deposited with the Anglo-California Trust Co., San Francisco, Calif., under a voting trust agreement which will be in effect for a period of seven years. The voting trustees will be five in number, including representatives of the bankers.

The corporation will make application to list both the convertible preferred stock and common stock on the San Francisco stock exchange upon the request of the bankers.

Canada Gypsum and Alabastine, Ltd., Annual Report

THE FOLLOWING is the annual report for the year ended December 31, 1928, of the Canada Gypsum and Alabastine, Ltd., Paris, Ont. The data are taken from the directors' report, which follows:

Earnings after deduction of operating and maintenance expenses amounted to $977,591.47, from which have been deducted interest on bonds and debentures and on purchase price of properties acquired $210,799.27, depreciation of plant and equipment and depletion of mines and quarries of $227,181.45, leaving a profit for the year of $539,610.75, which added to the surplus of the previous year of $155,224.93 makes a total of $694,835.68.

From this balance there has been deducted dividends of $206,866.09 paid on common stock, provision for dominion income tax of $48,771.12 and an amount of $200,000 written off bond and debenture discount, leaving a net surplus as shown by the balance sheet of $239,178.47.

A satisfactory working capital position is shown with current assets equal to 4.1 times current liabilities and a net working capital of $1,073,291, of which $300,523.48 is represented by cash and securities.

Plans and equipment have been maintained at a high degree of efficiency throughout. At Caledonia, the company's principal plant in eastern Canada, a new gypsum board machine and dryer were installed and improvements made at the Manitoba and British Columbia plants at a total cost of $310,662.10.

In March last year the stockholder approval was obtained of the purchase by the company of the business and properties of Manitoba Gypsum Co., Ltd., and of its subsidiary, British Columbia Gypsum Co., Ltd. Funds for this purpose and the retirement of outstanding 6½% bonds of the company were obtained through the issue of $2,500,000 of 5½% first mortgage 20-year bonds, $1,000,000 6% 20-year gold debentures and the issue to shareholders of 29,000 additional common shares.

The operation of these properties, which include in Manitoba a large plant for the manufacturing of gypsum products and the control of the only developed gypsum deposits in Manitoba; and in British Columbia a plant at New Westminster and a gypsum mine at Falkland, B. C., was taken over by the company in March, 1928.

Owing to the careful survey that had been previously made, and the cooperation of the staff at all branches and offices, the combined operation was assumed without interruption.

During 1928 building activity was largely increased. The company shared in this with the result that sales of the combined properties have shown an increase of 12% over the year 1927. A great deal of work has been done in the development of a wider range of products from a gypsum base, and it is very encouraging to find a growing interest in these. The resulting improvements in many of the processes of manufacturing during the year have resulted in lower factory costs, which will enable the company to sell its products at reduced prices and thus obtain a wider distribution.

Products of the company now cover such a wide range that they are used in all types of construction, from the small dwelling to the largest building of modern construction. Location of plants in the provinces of Quebec, Ontario, Manitoba and British Columbia assists in the effective distribution of these products. Export business, which the company is unusually well adapted to serve by water, with plants at Montreal and New Westminster, B. C., is being actively developed.

CANADA GYPSUM AND ALABASTINE
BALANCE SHEET
ASSETS

Land and buildings (freehold and leasehold, machinery and equipment as appraised by Canadian Appraisal Co., Ltd., in 1927 and 1928, with later additions and expenditures on shaft development at cost, less reserve for depreciation		$3,053,570.63
Mines and mine development as appraised by Canadian Appraisal Co., Ltd., in 1927 and 1928, less reserve for depletion		1,181,785.75
Investment in and advances to Nova Scotia Coal and Gypsum Co., Ltd.		83,820.39
		$4,319,176.77
Cash on hand and in banks	$	74,760.98
Montreal Trust Co.—Special deposit		125,000.00
Investments in bonds at cost		100,762.50
Accounts and bills receivable, less reserves thereon		600,208.20
Inventories of goods finished and in process and materials and supplies		512,770.71
		$1,413,502.39
Sundry assets	$	66,034.50
Deferred charges, advertising materials and office supplies		28,638.94
	$	94,673.44
Goodwill, bond and debenture discount and patent rights, less amounts written off	$	875,275.19
		$6,702,627.79

LIABILITIES

Capital:		
Authorized, 100,000 shares, no par value.		
Issued, 75,993 shares, no par value		$2,592,362.96
Surplus		239,178.47
		$2,831,541,43
First mortgage 5½% sinking fund gold bonds, due March 1, 1948—Authorized $4,000,000.00		
Issued		2,500,000.00
6% sinking fund convertible debentures, due March 1, 1948—Authorized and issued		1,000,000.00
Accounts payable and accrued charges	$	160,402.46
Dividend payable January 2, 1929		56,994.75
Accrued bond and debenture interest		65,833.32
Reserve for taxes		57,980.75
	$	341,211.28
Deferred liabilities	$	29,875.08
		$6,702,627.79

SURPLUS ACCOUNT, DECEMBER 31, 1928

Balance at credit December 31, 1927		$215,474.93
Deduct: Premium paid on redemption of 6½% first mortgage bonds		60,250.00
		$155,224.93
Net profits for year		$977,591.47
Less: Interest paid	$210,799.27	
Depreciation & depletion	227,181.45	437,980.72
		$539,610.75
		$694,835.68
Less:		
Dividends paid		$206,886.09
Provision for Dominion income tax		48,771.12
Written off discount on bonds and debentures		200,000.00
		$455,657.21
Balance at credit December 31, 1928		$239,178.47

Riverside Cement 1928 Earnings

THE RIVERSIDE Cement Co., for eight months ended December 31, 1928, reports net profit, after charges, including federal income tax, of $934,787, equivalent, after dividends on first preferred stock, to $3.15 a share on the 240,000 common A shares outstanding.

Income account for period is as follows: Profit before charges $1,353,642, depreciation and depletion $291,838, federal income tax $127,017, net profit $934,787.

John Treanor, president, in letter to stockholders, says: "Cement consumption in southern California has been at considerably lesser rate than for several years past. However, owing to substantial decreases in production costs, company's profits for first five months of the current year have proceeded at satisfactory rate."—*Wall Street Journal.*

Arundel Earnings Increase

THE ARUNDEL Corp. of Baltimore reports for the six months ended June 30 net income of $940,126 after charges, equal to $1.91 each on the 492,556 capital shares outstanding. This compares with $601,983, or $1.22 a share in the corresponding period of 1928. Net income for the month of June was $322,632 against $143,588 in June, 1928.

Penn-Dixie Earnings

THE FOLLOWING are the Pennsylvania-Dixie Cement Corp. earnings for the 12 months ended June 30, 1929:

PENNSYLVANIA-DIXIE CEMENT CORP.
EARNINGS

	12 months ending June 30—1929	1928	1927
Gross profit	$3,232,507	Not Available	
Deprec. and depl'n	1,362,934		
Profit after depr. and depletion	$1,869,573	$2,316,326	$4,343,914
Interest	714,431	955,393	1,249,032
Federal taxes	179,329		
Net profit	$975,813	$1,360,933	$3,094,882
Shs. of com. stock (no par) outstdg.	400,000	400,000	400,000
Earn's per sh. after pref. divs.	$0.06	$1.02	$5.46

Called for Redemption

THE ENTIRE issue of Construction Materials Co., first 6's, 1943, were called for redemption at 102 on July 1.

Dividends Announced

Bessemer Lime and Cement class A (quar.)	75c, Aug.1
Cleveland Quarries com. (quar.)	50c, Sept. 1
Consolidated Sand and Gravel pfd. (quar.)	$1.75, Aug. 15
Consumers Co. pfd. (s.-a.)	3½%, Aug. 20
Material Service (quar.)	50c, Aug. 15
Missouri Portland Cement (quar.)	50c, Aug. 15
North American Cement pfd. (quar.)	$1.75, Aug. 1
Superior Portland Cement class A (quar.)	27½c, Aug. 1

Birmingham Slag Company Completes Fifth Plant

THE FAIRFIELD, Ala., plant of the Birmingham Slag Co., built to handle the output of two large blast furnaces at the Fairfield works of the Tennessee Coal, Iron and Railroad Co., was recently completed. This plant, the company's fifth, has a daily capacity of 2000 tons, and embodies new features in engineering, construction and equipment. It comprises an office building, electric sub-station, screen house and loading house. "Slagtex" tile, manufactured by the company, were used in constructing the office and sub-station.

The screen house has a structural steel frame and is enclosed with slagtex tile and a tile roof, the latter the product of the American Cement Tile Manufacturing Co., Pittsburgh. The loading house consists of a steel frame structure with sheet metal covering; the Ingalls Iron Works Co., Birmingham, supplied the structural steel.

Parallel loading tracks are so arranged that the cars are removed by gravity at will. Above the plant is storage space for 100 cars, and facilities have been provided for handling an equal number below the plant. Cars may be loaded on either track. The slag is reclaimed from modified pits (dry slag canals about 700 ft. long) by a Marion electric shovel, and is carried to the crushing and cleaning plant in 40-yd. Sanford-Day bottom dump cars, equipped with motors operated by a third rail. It is then dumped at the crusher house into a Stephens-Adamson live roll grizzly. The minus 1½-in. slag falling directly into a large Symons cone-type crusher. After being crushed the slag is elevated to the top of the screen house and discharged over a magnetic pulley to Traylor vibrating screens, so arranged that all slag larger than 1-in. can be diverted to a smaller crusher in the screen house and reduced further. Under the screens are 14 bins for storing the various sizes. Bin gates may be automatically opened and closed by the operator in the loading house. He is thus able to release on to a 48-in. conveyor belt the exact quantity of each size required. The belt runs over an automatic scale and delivers the material to a washing table from which it is loaded into the cars.—*Manufacturers' Record.*

Hattiesburg Gravel Plants Making Improvements

EXTENSIVE improvements are being made by the Forrest County Gravel Co. and the Lincoln County Gravel Co., operators of plants in both counties, and they plan to add new and better machinery to take care of the constantly growing business. A large electric generator driven by an oil engine has been installed in the Forrest county plant, which has a capacity of 40 cars of sand and 40 cars of gravel per day. The owners have several locations in southern Mississippi, but are operating in Forrest county at the present time near Glendale.

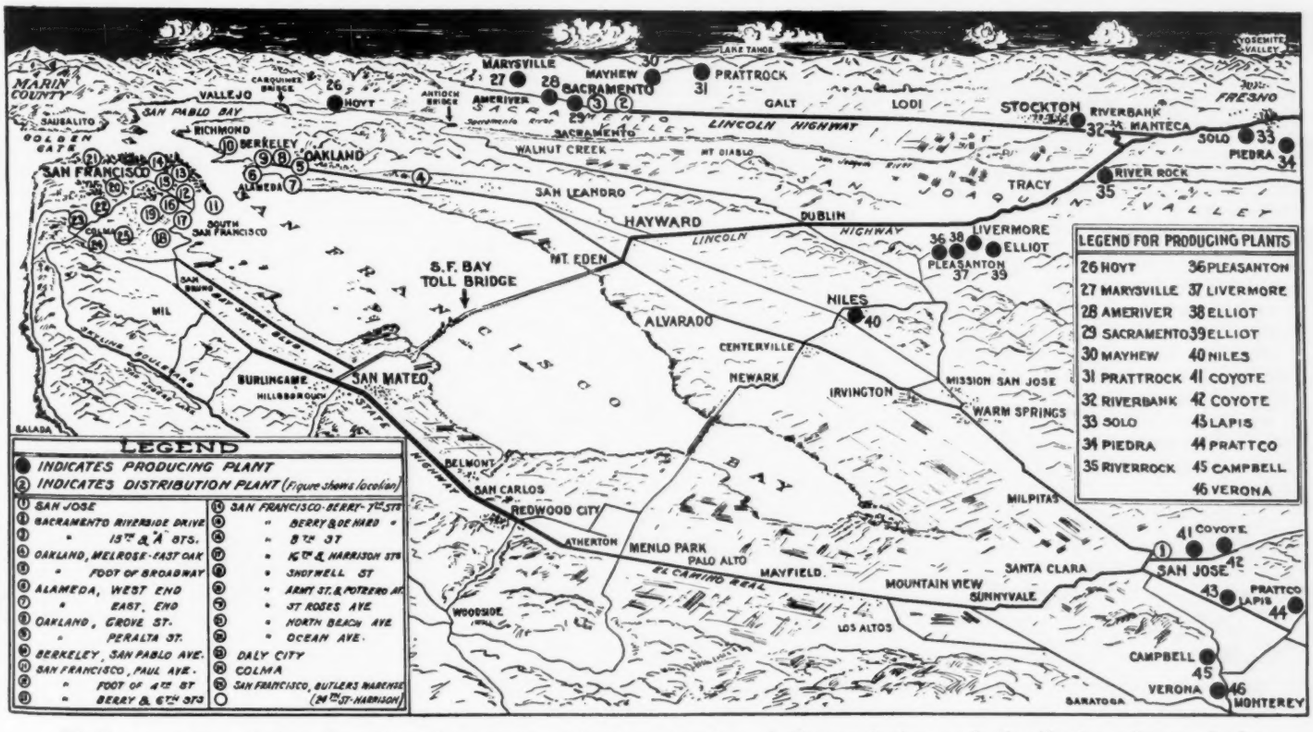
Howard E. Major of Hattiesburg has bought an interest in both the Forrest and Lincoln companies. He has been made vice-president of the first and secretary-treasurer of the second company.—*Hattiesburg* (Miss.) *American.*

California Gravel Companies in $20,000,000 Merger

RECENT announcement is made of the completion of final details by which nine large aggregate producers of central California, operating a total of 21 producing and 25 distributing plants, have been consolidated into the Pacific Coast Aggregates, Inc. The companies entering the merger are the Rhodes-Jamieson Co., Associated Gravel Co. and Acme Gravel Co., Pratt Rock and Gravel Co. and Pratt Building Material Co. with subsidiaries, Bay Development Co. with subsidiary, Santa Clara Gravel Co., G. and M. Gravel Co., T. I. Butler Co., Inc., California Building Material Co., Piedra Rock Co. and California Rock Co., constituting a substantial majority of the important producers and distributors in central California of sand and gravel. The properties involved have an appraisal value of approximately $20,000,000.

By the action of this group the Pacific Coast Aggregates, Inc., becomes one of the world's largest sand, rock and gravel companies. Virtually every large producing and distributing company engaged in the sand, rock and gravel business in the San Francisco bay region and in the territory from Oroville on the north to Monterey and Fresno on the south are in the merger.

The financial details involved in the merger were worked out by the California Co., Los Angeles, Calif., which also underwrote issues of stocks, bonds and gold notes of the New Pacific Coast Aggregates, Inc. Full details of the financing are given in the "Financial News" pages of this issue.



Bird's-eye view of San Francisco Bay region showing location of the producing and distributing plants of the recently organized Pacific Coast Aggregates, Inc.

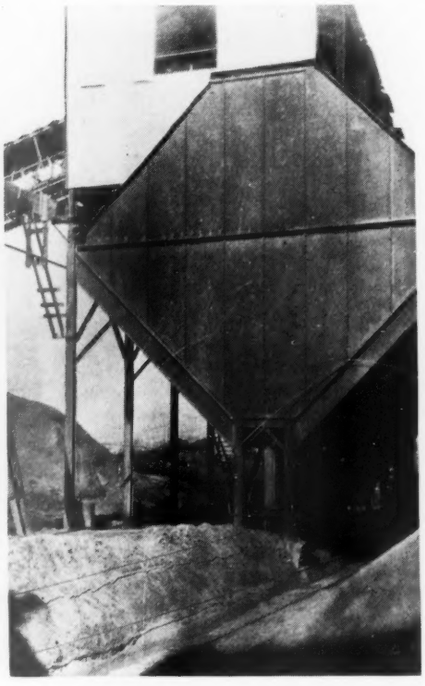
Hints and Helps for Superintendents

The bins are open on one side for reclaiming by clamshell buckets if desired

Bins of Unusual Design Facilitate Stockpiling

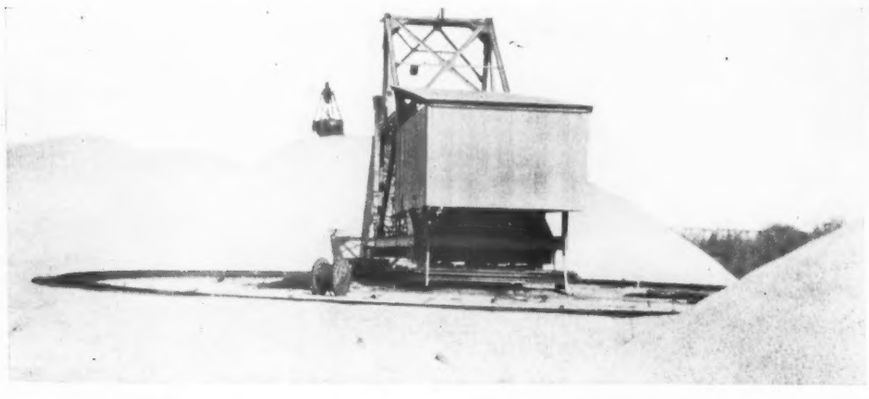
THE bins shown in the two illustrations were designed by W. S. Weston and I. Weston, of the Weston-Brooker Quarries Co., Cayce, S. C., and are a rather novel piece of engineering. They are of steel and have eight compartments with the rotary washing screens mounted on top of the bins, permitting the various sizes to pass to them by gravity. The design of the bins is such as to provide hopper bottoms and to insure maximum capacity of stone with a minimum amount of structural steel.

For car loading or truck shipments the rock is drawn on to a belt conveyor running under the long axis of the bins and the desired aggregate mixture regulated by opening gates under the proper bins. However, during the slack season it becomes desirable to stockpile, and when this is necessary the reason for the unusual shape of bin is apparent, as a clamshell can remove the material from the open half of the various bins and deposit it to the proper pile without trouble.



End view of bin showing construction

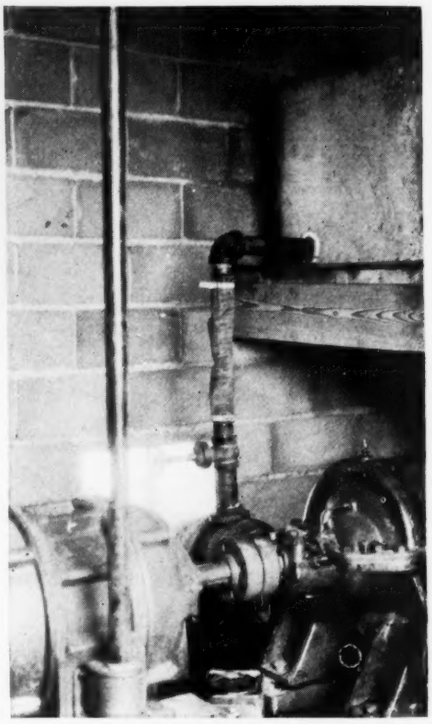
The clamshell excavator arrangement is also of their own design. It consists of a circular track set at a distance back from the bins but still within the radius of the long boom of the excavator. The excavator, when it has picked up a bucketful of material, revolves on its circular track and deposits the material on the proper pile. These stockpiles are distributed around the periphery of the circle formed by the shovel boom's radius.



The clamshell excavator mounted on a circular track stockpiles from the bins

Priming Tank for Pumps

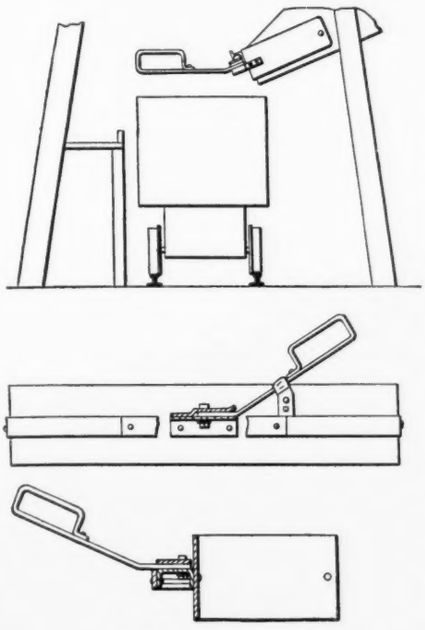
TO save the cost of installing a small pump or water tap for priming a larger centrifugal pump, the Wapak Sand and Gravel Co. of Wapakoneta, Ohio, installed a sheet metal water tank in the pump house above the pump for priming. This was connected, as shown in the illustration, to the intake line right at the pump. A valve in the connection can be opened to permit the water to flow to the pump for priming, and then can be closed when the pump is properly operating. The tank is filled through the same connection when the pump is in operation. The device is used on the pump raising washing water to the screenhouse.



Storage tank serves to prime pump

Chute Gate Reduces Accidents

THE chute gate shown in the sketch, developed by John Williams, mine blacksmith foreman, has greatly assisted in reducing hand injuries in connection with tramming at the Old Dominion mine, according to Charles Mendelsohn, mechanical superintendent. A platform and foot shield for the operator are also shown. This shield under some conditions might prove more effective if placed at a high elevation.—*Engineering and Mining Journal.*



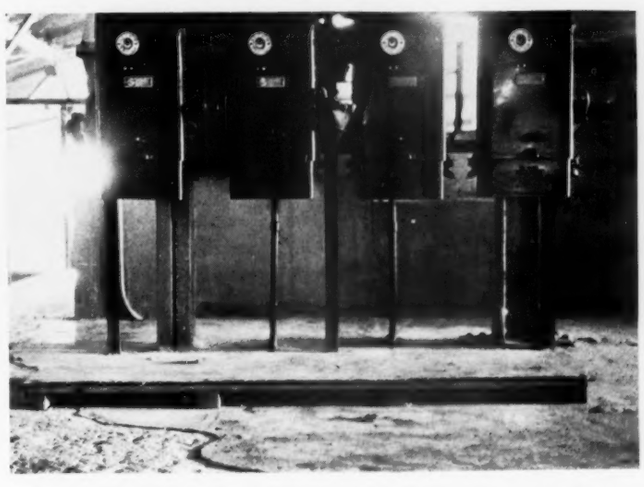
Safety chute gates

Eliminating Static and Stray Current Shocks

STATIC and stray current shocks received while handling electrical equipment or working about switchboards and starting panels are not necessarily dangerous but often annoying. Certain localities seem to be more sensitive to these stray electrical currents than others; in Cuba this phenomenon is very pronounced.

In the only cement plant on the island of Cuba all of the compensators have a wood platform, covered with a piece of rubber belting as tread surface, in front of them, on which the operator stands when operating the levers. An additional means of protection, in the way of an old rubber glove, may be seen draped over the handle of one of the compensators. By these means the native operator is protected from stray currents.

All compensators and motors in this plant are grounded.



Insulated platform prevents static and stray current shocks

Wider Pulleys Needed for Line-Start Motors

THE INCREASING use of line-start motors has brought along a problem of pulley-spin when the motor is started, according to J. R. Hopkins of the Chicago Belting Co., Chicago. The failure of many motor manufacturers, Mr. Hopkins continues, to include wider pulleys on this type of motor is responsible to a great degree for the excessive pulley-spin which is quite wearing to the belt. Several motor manufacturers have recognized the need of the wider pulley and accordingly are equipping their line-start motors with pulleys of ample width, Mr. Hopkins states.

Briefly, Mr. Hopkins summarizes the pulley and belt requirements for these mortors as follows:

Normal load line-start motors require a pulley and belt from 20% to 25% wider than used with a standard motor. That is, if the belt used with a standard motor was a 4-in. belt, you would require a 5-in. belt on the line-start motor of the same horsepower. This applies to all of these motors 7½-hp. and over.

High-torque line-start motors should be ordered with pulleys 50% wider than for standard motors of the same rating on all motors 10 hp. and over. On these motors the maximum torque in starting ranges between 2.38 times full load to 3 times full load. This necessitates a pulley and a belt 50% wider. Sometimes the starting load indicates that a belt a little less or more than 50% wider is needed.

Where there are existing line-start motors now giving trouble, the operator should see if he can put on a heavier belt and can increase the speed by increasing the diameter of the pulley. If that does not work, then they can try increasing the diameter and also increasing the pulley width about 20%.

Protecting Well Drill Holes

ORDINARILY the blasting operations at the Consolidated Rock Products Co. quarry, near Brooksville, Fla., consists of drilling a few churn drill holes at considerable distances back from the high face, springing the holes with gelatin dynamite, and then shooting the holes with black powder. This method of shooting is very satisfactory as the rock proper is embedded in a matrix of softer limestone and the hole is very stratified and broken so that a fast powder would merely tend to pack the mass instead of shaking it up, which is all that it is necessary to do. However when shooting "in the solid," as when starting a new bench, holes are spaced on 10 to 12 ft. centers, and are similarly loaded and shot. Each hole, after drilling, is plugged with a wooden plug and a neat dam of dirt is built around each one so as to prevent water from rains and seepage from filling them and causing the attendant troubles.

Drilled holes are plugged and covered for protection

Foreign Abstracts and Patent Review

Cement and the Chemical Industry—Dr. H. Kuehl illustrates the close interrelationships between the cement and chemical industry. A recent theory on the hardening of cement holds that it is a colloid-chemical shrinking process of a mass of swelled gel. There is a formation of gel from cement and water at the surface of the cement grains and a shrinkage of this mass of gel by interior suction which is produced at a later stage by the still undecomposed cores of the cement grains which withdraw water for their own hydration from the masses of gel formed on the surface of the grains and cementing them. These masses of gel are physically very similar, but chemically very different. They are calcium hydrosilicate in the silicate and alumina hydrosilicate in the alumina cements.

The best cements are obtained with clay of a somewhat abnormal composition, giving portland cements either especially high or low in silica. This condition is produced by adding to the raw mix before burning ground quartz, flint or sand, and for the low silica cement, ground bauxite, iron ore or certain slags. In decreasing the silica content, special attention must be given to the relation of alumina to ferric oxide, for if the alumina content is too high, the cements develop a very rapid set. Low silica cements have a certain advantage over other cements in that they need not be ground so finely in order to assure high early strength, for the aluminates abounding in such cements in greater quantities, are far more able to react than the silicates which form the main constituent of the cements high in silica. It appears that further progress in the production of rapid hardening portland cements is to be expected from the sintering process, where further research of details is very important.

The hardening energy of portland cement has recently been increased by admixtures of ground "catalyzers" after the burning for a recent study of the influence of all easily accessible anions and cations upon the rapidity of hardening of portland cement showed occasionally surprising results. The initial strength of a cement was increased by the addition of about 2% of calcium bromide, from 58 kg./cm.^{2} to 238 kg./cm.^{2}. Data for building up a scientific system in respect to the effect of "catalysers" are still lacking, for the individual cements are so different. The lime combinations in the silicate cements are dibasic and tribasic, and in the alumina cements essentially only monobasic. The following approximate equation indicates that in the hydration of silicate cements there is a disintegration and in the hydration of the alumina cements a synthesis of the lime-abounding combinations of the reacting constituents under simultaneous liberation of calcium hydroxide in the first and alumina hydroxide in the second case:

$$3CaO\cdot SiO_2 + xH_2O = 2CaO\cdot SiO_2 yH_2O + Ca(OH)_2$$

$$3(CaO\cdot Al_2O_3) + xH_2O = 3CaO\cdot Al_2O_3\cdot yH_2O + 2Al_2(OH)_6$$

The alumina cement is more resistant to chemical aggression particularly sulphate waters, than any other cement. More cooperation between the iron industry and the slag consumers is being effected especially in times of economic depression in respect to the production of iron portland and slag cements. In Leverkusen the manufacturer of sulphuric acid from gypsum has been started with portland cement as a byproduct. A raw mix of gypsum and clay is burned which yields sulphurous acid for manufacturing sulphuric acid and a residue of about the composition of portland cement clinker. At first the large percentage of calcium sulphide caused some trouble, but now the cement clinker is equal in quality to portland cement clinker produced in the usual way. Another concern plans to burn mixes of rock phosphate, coal and bauxite. The liberated phosphorous is to be treated further to make phosphoric acid and the clinkered residue resulting from the reduction process; i. e., a combination of the calcium oxide of the phosphates and the added bauxite, which has principally the composition of the alumina cement, is to be recovered as such. The large amounts of phosphides of the process are more detrimental to the fused cement than sulphides are to the qualities of the portland cement, and further the silica content is rather high. In many chemical processes there are lime sludge residues to be utilized; for example, in the further treatment of the residue sludges from the calcium carbide manufacturing process.—*Tonindustrie - Zeitung* (1928) **52**, 91, 1817-20.

Hydration of Dehydrated Gysum. P. Budnikoff, Russia, concludes that the hydration of the natural and the synthetic gypsum, which is dehydrated at 140 deg. C. (284 deg. F.) takes places comparatively rapidly at the beginning, until semi-hydrate is formed. At a point located near the semi-hydrate, a retarding action takes place and in the last period again hydration is slowed by the formation of a gel on the surface of the gypsum bodies. The hydration of the natural and synthetic gypsum, dehydrated at 140 deg. C., occurs within 1 to 2 seconds after contact with liquid water. A definite retardation occurs near the semi-hydrate, after which the process speeds up again. The rapidity of the absorption of water until the full dehydrate is reached depends upon the period of dehydration of the gypsum. The speed of hydration of the gypsum after the formation of the semi-hydrate decreases with an extension of the dehydration period of the gypsum.—*Kolloid-Zeitschrift* (1928) **2**, 95-97.

Production of Fused Cement. Bauxite and lime are heated separately to a high temperature and then brought in contact with each other in a separate previously heated chamber, where the fusing takes place.—*German Patent No.* 457,463.

Colored Building Material—Sand or finely-divided stone, granite, etc., is mixed with a coloring matter (minerals such as glauconite or aniline dyes) together with sufficient portland cement to bind to a weak, friable mass. This is then broken down again. The color-retaining properties of this material may be enhanced by the incorporation of a small amount of oily matter.—*British Patent No.* 307,448.

Early High Strength Cement. A raw cement mix comprising the usual lime contents of normal portland cement and a low silica content. Keeping the silica modulus at or about 1.65 (on the basis of the burned mix) the mix is burned in a rotary. The amounts of alumina and iron oxide present are kept equal. Subsequent additions of alumina or iron oxide are controlled so as not to disturb the silica modulus of 1.65.—*German Patent No.* 457,621.

Refractory Brick — Hydrated magnesium silicates, more especially serpentine, may replace the talc in the process whereby the material is heated with magnesia in the presence of small amounts of accelerators to form magnesium orthosilicate.—*British Patent No.* 307,391.

Composition and Properties of Slag Cement—J. Cheret de Langavant reviews the researches of Le Chatelier, Feret, Lafuma, Fritsch and others on the composition of blast furnace slags. The effects produced on granulations are discussed as well as the characteristics of slag cement. The influence of diverse components on its resistance to sea water, selenitic water and pure water; rapidity of set and of hardening; volume consistency; action of calcium sulphide on the iron constituents; the mixing of slag cement with lime or other cements are treated in detail.

Slag cement is not considered as a puzzuolanic cement, for the granulated slag is a genuine cement, capable of setting and

hardening slowly without any additive materials. Under the influence of a small quantity of lime, it sets and hardens with a rapidity analogous to that of portland cement. The mechanical characteristics depend almost exclusively upon the slag employed and are but little influenced by the nature and the proportion of the lime employed.

The commercial slag cements are in general slower hardening than the artificial portland cements, but this hardening continues for many years and the ultimate strengths reach the same magnitudes as those of the artificial cements. Commercial slag cements are little affected by the action of salt waters destructive to many cements, such as sea water, magnesia water, selenitic water. They can be made even more resistant to these waters if necessary. Slag cement does not attack iron, and expands but slightly, the author states. Mixtures of slag cement with lime or portland cement, in all proportions, can be effected easily. It is possible to place layers of portland cement concrete on a concrete of slag cement.—*Rev. des Mater. de Constr. et de Trav. Pub.* (1928) **222, 223,** 139-42; **224,** 171-76; **225,** 208-15.

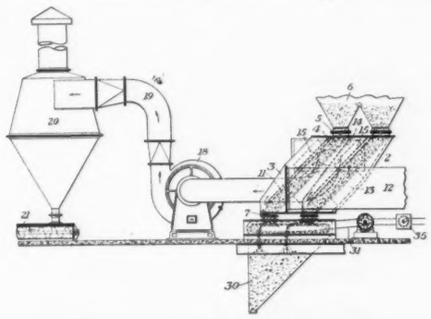
Recent Process Patents

The following brief abstracts are of current process patents issued by the U. S. Patent Office, Washington D. C. Complete copies may be obtained by sending 10c to the Superintendent of Documents, Government Printing Office, Washington, for each patent desired.

Method of Treating Gypsum—The author proposes to treat low grade gypsum in which the impurities are harder than the gypsum, by first grinding the material to a reasonable fineness and calcining this product. In the calcination further reduction and flaking of the gypsum is an inherited characteristic and makes it possible to effect a separation between the finer fluffy gypsum and the coarse granular impurities. He presents a method of making this separation by again pulverizing in a suitable mill through which a current of air passes. The action in this mill is to remove the lighter gypsum dust and discharge the coarse material to a separate bin. The process is in essence similar to that used in preparing lime hydrate.

The coarse material will still be of cementitious value and he proposes to grind this material for sanded hardwall plasters.—*Robert E. Haire, Ontario, Canada.* U. S. Patent No. 1,702,940.

Coal Dryer. A new method of coal drying passes the coal by gravity through the cyclone to escape into the atmosphere, an inclined chute (about 45 deg.) instead of dropping it through a vertical shaft as in some previous forms. The bottom of the chute is a grid with opening arranged so that the coal does not tend to pass out of them. The upper part of the chute is a screen. The hot air, or waste gases from

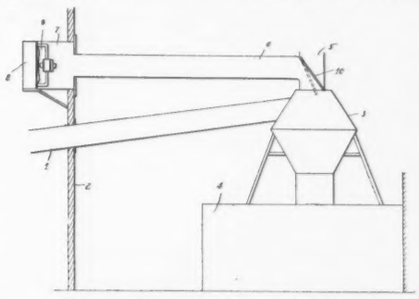


Arrangement for drying coal

baffle and escapes into the box in which in warm weather to permit the air from combustion, passes from below through the grid and the bed of coal in the chute and strikes a baffle plate above the screen. It flows downwardly between the screen and the chute is enclosed, whence it is drawn off by a fan. The exhaust side of the fan is connected with a cyclone separator which catches any fine coal that the fan may draw over. The baffle above the screen and the flow of the escaping gases between it and the screen are said to be very advantageous in promoting uniform drying and collecting fine dust which falls into the chute.

The bottom of each chute is over a plate which is just large enough so that the coal cannot run out of the chute. These plates are swept by a chain conveyor carrying rods that push the dried coal from the plate. Flexible baffles hung from the bottom of the chute close the space between the plate and the chute when the rode are not passing and this prevents the upward flow of air into the current of hot gases. The advantages for this form of dryer, claimed by the patentee, are that the downward flow of the coal is not interfered with by the upward velocity of the hot gases and that a more uniform drying action throughout the bed is secured.—*L. J. Robb.* March 26, 1929. U. S. Patent No. 1,706,708.

Saving Heat in Dust Collecting. A method of collecting dust from artificially heated rooms includes means for returning the heated air to the rooms after it has been freed from dust. The dust laden air is sent by a fan to a dust collector of the cyclone type. The exhaust instead of passing from the cylclone into the atmosphere goes by a return line back to the room



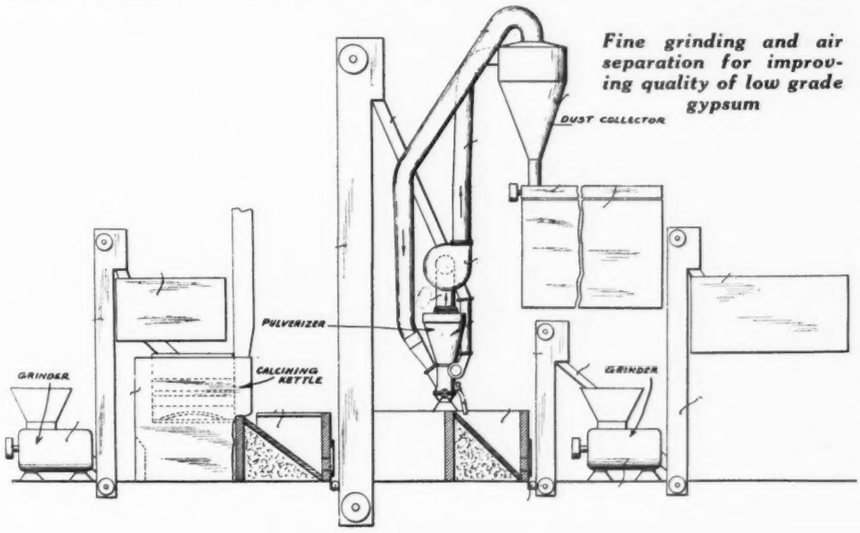
Saving heat in dust collecting

from which it came, passing through an air filter which removes any dust that may not have been settled in the cyclone. A fan is placed before the air filter to create pressure to carry the air through the filter and aid in the removal of air from the cyclone.

A valve in the return line may be opened thus aiding in the cooling and ventilating of the room.—*H. K. Hutton.* March 26, 1929, U. S. Patent No. 1,706,449.

Process for Washing Sand and Gravel. The apparatus shown, according to the patent, is being fed by a centrifugal pump, as in an ordinary dredging operation. The stream is spread over a "fanning" table and passes through one or more screens to remove the gravel. Then it goes into a settling tank provided with an overflow to take away the waste water and silt. The settled sand is removed through a manually controlled valve.—*H. G. Young,* March 5, 1929. U. S. Patent No. 1,704,115.

(The editor has carefully studied the above described process as it is given in the patent paper and can find no essential difference, either in method or apparatus, between it and the "process" that is used in many plants for exactly the same purpose. Some of the plants using this same system of screening and sand settling have been working for many years.)



Fine grinding and air separation for improving quality of low grade gypsum

Traffic and Transportation

Car Loadings of Sand and Gravel, Stone and Limestone Flux

THE following are the weekly car loadings of sand and gravel, crushed stone and limestone flux (by railroad districts) as reported by the Car Service Division, American Railway Association, Washington, D. C.:

CAR LOADINGS OF SAND, GRAVEL, STONE AND LIMESTONE FLUX

District	Limestone Flux Week ended June 29	Limestone Flux Week ended July 6	Sand, Stone and Gravel Week ended June 29	Sand, Stone and Gravel Week ended July 6
Eastern	4,093	3,373	17,336	15,253
Allegheny	4,200	3,591	10,886	8,992
Pocahontas	504	497	1,447	1,069
Southern	563	481	9,782	9,165
Northwestern	623	1,178	11,030	9,314
Central Western	525	391	14,892	11,690
Southwestern	503	398	8,297	6,859
Total	11,011	9,909	73,670	62,342

COMPARATIVE TOTAL LOADINGS, BY DISTRICTS, 1928 AND 1929

District	Limestone Flux 1928 Period to date July 7	Limestone Flux 1929 Period to date July 6	Sand, Stone and Gravel 1928 Period to date July 7	Sand, Stone and Gravel 1929 Period to date July 6
Eastern	69,563	83,045	200,870	211,364
Allegheny	83,348	89,632	152,663	145,033
Pocahontas	10,913	9,586	19,485	19,843
Southern	14,872	13,515	271,164	218,612
Northwestern	30,817	25,499	137,177	120,671
Central Western	10,805	13,795	237,904	231,701
Southwestern	11,069	12,092	148,310	155,245
Total	231,387	247,164	1,167,573	1,102,469

COMPARATIVE TOTAL LOADINGS, 1928 AND 1929

	1928	1929
Limestone flux	*231,387*	*247,164*
Sand, stone, gravel	*1,167,573*	*1,102,469*

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week beginning July 29:

SOUTHERN FREIGHT ASSOCIATION DOCKET

46145. **Sand, gravel, crushed stone, slag, etc.,** between southern points—commodity description. It is proposed to revise the present description published in Agent Glenn's Freight Tariff 88A, I.C.C. A655, to read as follows:

"Sand, gravel, crushed stone, slag, unground in bulk, rubble stone, broken stone and chert, in straight or mixed carloads (See Note 3)."

21187. **Sand and gravel,** carloads (See Note 2), from Georgetown, D. C., to Washington Grove and Gaithersburg, Md., 70c per net ton (present rate 90c per net ton). Reason—Proposed rates are comparable with rates on like commodities from and to points in the same general territory.

21205. **Sand and gravel,** carloads (See Note 2), from Philadelphia, Penn., to Darby, Collindale and Oakeola, Penn., 60c per net ton (present rate 80c per net ton). Reason—Proposed rates are fairly comparable with rates on like commodities for like distances, services and conditions.

21049. **Ground limestone,** carloads, minimum weight 50,000 lb.

From Group 1—Thomasville, Penn.; Bricklyn, Penn.; York, Penn.; Hanover, Penn.; Bittenger, Penn.; East York, Penn.

From Group 2—Union Bridge, Md.; Pinola, Penn.; Caweton, Md.; Security, Md.; *Salisbury, Md.; Pinesburg, Md.; Charlton, Md.

Rates in cents per 100 lb.

Group 1, to South Salisbury, Md., 12½c.
Group 2, to South Salisbury, Md., 15½c.

21219. **Crushed stone,** carloads (See Note 2).

Rates in cents per 2000 lb.

From	Prop.	Pres.
Birdsboro to Tamaqua, Penn.	90	105
Trap Rock to Tamaqua, Penn.	90	105
Alburtis to Tamaqua, Penn.	105	115
Steelton to Tamaqua, Penn.	125	140
Stowe to Tamaqua, Penn.	90	140
Tuckerton to Tamaqua, Penn.	80	105
Myerstown to Tamaqua, Penn.	105	140
Paxinos to Zehners, Penn.	90	17½

Reason—Proposed rates are comparable with rates on like commodities for like distances, services and conditions.

M1191. **Crushed stone,** carloads (See Note 2), from Bound Brook, N. J., to Matawan, N. J., 75c (present rate 92c) per net ton. Reason—Proposed rates are fairly comparable with rates now in effect from Springfield to Flemington.

46197. **Calcite,** from Sparta, Tenn., to Auburn, Ind. Present rate, 553c per net ton. (Cincinnati, O., combination.) Proposed rate on calcite, ground or pulverized (ground or pulverized limestone or marble), carloads (See Note 1), except when car is loaded to full visible capacity actual weight will apply (not subject to Rule 34 of Southern Classification), from Sparta, Tenn., to Auburn, Ind., 445c per net ton, made with relation to other points in the same territory.

46231. **Calcite,** from Cartersville, Ga., to Freeport, Ill. Combination now applies. Proposed rate on calcite, ground or pulverized (ground or pulverized limestone or marble), carloads (See Note 1), except when car is loaded to full visible capacity actual weight will govern, from Cartersville, Ga., to Freeport, Ill., 530c per net ton, same as rate on ground or pulverized marble from Tate, Ga., and powdered whitestone from Whitestone, Ga.

Note 1—Minimum weight marked capacity of car.
Note 2—Minimum weight 90% of marked capacity of car.
Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

46280. **Gravel,** Johnsville, Tenn., to Selmer, Tenn. It is proposed to establish reduced rate of 125c per net ton on gravel, carloads, minimum weight 90% of marked capacity of the car, except when car is loaded to full visible capacity actual weight shall govern. Not subject to Rule 34 of Southern Classification—from Johnsonville, Tenn., to Selmer, Tenn.

46302. **Soapstone and talc,** from Chatsworth, Canton, Jasper, Cartersville, Ga., and Kinsey, N. C., to Madison, Wis. Combination rates now apply. Proposed rates on soapstone and talc, carloads, minimum weight 50,000 lb., to Madison, Wis.: From Chatsworth, Ga., 579c; from the other origins named above, 660c per net ton—same as current rates to Milwaukee, Wis.

46304. **Limestone,** from Calera, Ala., to C. of Ga. Ry. stations. It is proposed to reduce the rates on limestone, carloads, from Calera, Ala., to certain common points on the line of the C. of Ga. Ry., to be the same as in effect via other lines, and to hold the intermediate local stations to be no higher than the common point to which it is intermediate.

46325. **Feldspar,** from Axton, Va., to Brookneal, Va. Class rate now applies. Proposed rate on feldspar, crude, carloads, minimum weight 80,000 lb., from Axton, Va., to Brookneal, Va., 130c per net ton.

46361. **Limestone,** from Bridgeport, Tenn., Buquo, N. C., Fletchers, N. C., Hot Springs, N. C., Knoxville, Tenn., Mascot and Strawberry Plains, Tenn., to stations in Carolina territory. It is proposed to revise the interstate rates on ground or pulverized limestone, carload, minimum weight 60,000 lb., from Bridgeport, Tenn., Buquo, N. C., Fletchers, N. C., Hot Springs, N. C., Knoxville, Tenn., Mascot, Tenn., and Strawberry Plains, Tenn., to stations on the A. C. L. R. R., S. A. L. Ry., in Carolina territory north of Savannah, Ga., also N. S. R. R. stations, on basis of scale prescribed in the Interstate Commerce Commission in Docket 19943, of April 1, figuring distances via workable routes. The present and proposed rates from Mascot, Tenn., and Buquo, N. C., to a number of representative points will be furnished upon request.

46364. **Stone, rubble or crushed,** from Riverton, Va., to Orange, Va. (when for R. F. & P. R. R. stations). It is proposed to establish rate of 99c per net ton on rubble or crushed stone, carloads, minimum weight 90% of marked capacity of car, except when cars are loaded to their visible capacity actual weight will govern, from Riverton, Va., to Orange, Va., applicable on intrastate traffic destined to R. F. & P. R. R. stations and moving in connection with the Virginia Central R. R. Proposed in order to place Orange, Va., route in connection with the Virginia Central R. R. on traffic destined to R. F. & P. R. R. stations on competing basis with the Alexandria, Va., route.

46365. **Slate, crushed, or stone chips or granules,** from Arvonia, Dutch Gap and Esmont, Va., to Savannah, Ga. Present rate, 50c per 100 lb. (8th class). Proposed rate on slate, crushed, or stone chips or granules, in packages or in bulk, carloads, minimum weight 60,000 lb., from and to above mentioned points, 360c per net ton.

46381. **Asphalt aggregate** from Kosmosdale, Ky., to points in C. F. A. and I. F. A. territory. In lieu of combination rates it is proposed to establish through rates on stone (crushed), broken or ground (including crushed natural asphalt stone), stone screenings, chert, gravel, sand and/or slag, mixed or coated with asphalt, oil, tar and/or lime; the weight of asphalt, oil, tar and/or lime content to be more than 2% but not more than 9% of the whole and the percentage of the mixture to be specified on the bill of lading; carload minimum weight 90% of marked capacity of car, except where the car is loaded to full visible capacity actual weight will be charged for—from Kosmosdale, Ky., to destinations in C. F. A. and I. F. A. territory. Statement showing present and proposed rates to representative destinations will be furnished upon request.

46392. **Fluorspar,** from Frankfort and Nicholasville, Ky., to southeastern points—cancellation. It is proposed to cancel, on the obsolete theory, the present commodity rates as published in Agent Speiden's I. C. C. 1202, from the origins mentioned, to southeastern points named on pages 211 and 212 of tariff named above. Class rates to apply after cancellation.

CENTRAL FREIGHT ASSOCIATION DOCKET

22078. To establish on **crushed stone,** carloads, from Greenfield, O., to C. & O. Ry. main line stations in Kentucky and West Virginia (as shown below), via D. T. & I. Ry., Gregg, O., following rates (in cents per net ton):

	Rate
Limeville to Oliver, Ky.	115
Little Sandy, Ky., to Ceredo, W. Va.	125
Westmoreland to Wilson, W. Va.	140
Barboursville to Milton, W. Va.	140
Culloden to Lewis, St. Albans, Spring Hill, W. Va.	160
South Charleston to Chelyan, W. Va.	175
Cabin Creek Jct. to Crown Hill, W. Va.	175
Hansford, Pratt, Handley, Morris Creek Jct. to Powellton Jct., W. Va.	185
Mt. Carbon to Old Gauley and Gauley, W. Va.	185

Present rates, classification basis.

22082. To amend Item No. 1245 of C. F. A. L. exceptions to Official Classification No. 130-S, by adding Thebes, Ill., as an additional origin point, on the same basis as Kellogg, Ill. The item referred to above provides for basis of 65% of sixth class on **limestone, crushed or ground,** carloads, from East St. Louis, Joliet and Kellogg, Ill., St. Louis, Mo., Springfield, Ill., and east bank Mississippi River crossings, on traffic originating at points west of the west bank of the Mississippi River, and on limestone originating in said territory, which is crushed or ground at East St. Louis, Joliet, Ill., St. Louis, Mo., and Springfield, Ill., to destinations in C. F. A. and arbitrary territories.

22083. To establish on **sand and gravel,** carloads, Huron, Amherst, Ceylon, Toledo and East Toledo to Cincinnati, O., same rates on interstate traffic as are in effect on Ohio state traffic as shown below.

To Cincinnati, O. (Rates apply per net ton)

From	Present Inter-state	Present Ohio state	Proposed Inter-state	Proposed Ohio state
Huron, O.	202	120	120	120
Amherst, O.	202	120	120	120
Ceylon, O.	202	120	120	120
Toledo, O.	*168	120	120	120
East Toledo, O.	*168	120	120	120

*Common sand, $1.40.

22086. From C. F. A. territory to Western Trunk Line Committee territory. To establish on **sand, molding,** carloads, from E. & O. V. stations to Des Moines, Red Oak, Lemars and Sioux City, Ia., following rates. Present and proposed rates (in cents per net ton):

To	Miles	Pres.	Prop.
Des Moines, Ia.	501	411	390
Red Oak, Ia.	580	411	390
Lemars, Ia.	717	455	400
Sioux City, Ia.	693	458	400

22087. From C. F. A. territory to Canadian Freight Association territory. To establish on **sand, lake, river and bank; sand, ground from silica or pebble rock; and sand, loam,** carloads, from Manitowoc, Wis., via car ferry, to Toronto, Ont., rate of $3.65 per net ton, applicable only on traffic originating beyond Manitowoc. Present rate, sixth class.

22152. To establish on **crude (oversize) gravel,** carloads, from Kent, O., to Akron, O., rate of 60c per net ton, to expire 60 days from effective date. Present rate, 70c per net ton, per W. & L. E. Ry. Ohio No. 1078.

CENTRAL FREIGHT ASSOCIATION DOCKET

22126. To establish on **sand, viz., blast, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding and silica,** carloads, from Emlenton Spur, Penn., to destinatioss shown below, following rates, in cents per net ton:

To	Rate	To	Rate
Brantford, Ont.	284	Pittsburgh, Penn.	176
Butler, Penn.	139	Toledo, O.	230
Cleveland, O.	180	Washington, Penn.	189
Detroit, Mich.	240	Wheeling, W. Va.	189
Midland, Penn.	189	Youngstown, O.	139
Niag. Falls, N. Y.	140		

Present rates, classification basis.

22127. To establish a rate of $1.55 per net ton on **crushed stone,** carloads, from Silica, O., to Middleville and Caledonia, Mich.

22156. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing loam, molding or silica) **and gravel,** carloads, from Winona Lake, Ind., to Sidney, Ind. (N. Y. C. & St. L. R. R. delivery), rate of 90c per net ton. Present rate, 200c per net ton, 6th class.

22157. To establish on **sand or gravel,** carloads, Richwood, O., to Fostoria, O., rate of 90c per ton of 2000 lb. Present rate, sixth class rate of 270c per ton of 2000 lb.

22158. To establish on **sand** (all kinds) and **gravel,** carloads, Toledo and Ironville, O., rate of 95c per net ton to Hartland, O., and 100c per net ton to Clarksfield, O. Present rate, 80c per net ton.

22159. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) and **gravel,** carloads, Wolcottville, Ind., rate of 90c per net ton. Present rate, 95c per net ton.

22163. From C.F.A. territory to Official Classification territory except Canada. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) **and gravel,** carloads, from Columbus, Ind., to Osgood, Ind., B. & O. R. R. delivery, rate of 90c per net ton. Present rate, 104c per net ton.

22164. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica) **and gravel,** carloads, from Hadley, Penn., to Sharon, Penn., via N. Y. C. R. R., Amasa, Penn., and Erie R. R., rate of 70c per net ton. Present rate, 90c per net ton via N. Y. C. R. R., sixth class via Erie R. R.

22165. To establish on **sand,** carloads, Midway, O., to Cleveland, O., rate of 130c per net ton. Present rate, 150c per net ton. Route—Wabash Ry., Toledo, O., W. & L. E. Ry.

22166. To establish on **sand and gravel,** carloads, from Wapakoneta, O., to Findlay, O., rate of 80c per net ton. Present rate, 90c per net ton.

22167. To establish on **crushed stone, sand and gravel,** in bulk, in open cars, carloads, from Buffalo, N. Y., to Erie, Penn., via N. Y. C. & St. L. R. R., rates as shown below: Present and proposed rates (in cents per net ton)—To Erie, Penn. (87.7 miles), sand and gravel, 113c; crushed stone, 115c. I. C. C. Docket 15329 scale, 100c; proposed, 100c.

22174. To establish a basis of 65% of sixth class on **crushed or ground limestone,** carloads, from Eldred, Alton and Elsah, Ill., to C.F.A. destinations listed in Item 748 of Supplement 35 to W.T.L. Tariff 58 series. Present rate, class or combination basis.

22189. To amend C. & O. Ry. Tariff 50-H, I. C. C. 10464, as follows: Now reads: **Sand, common building, glass or molding,** carloads, and **gravel,** carloads, from Ashland, Augusta, Ausanba, Lawton, Limestone, Mentor, Olive Hill and Silica, Ky., to C.F.A. territory. Change to read: **Sand, glass and/or molding,** carloads, from Ausanba, Lawton and Mentor, Ky., to C.F.A. territory. The proposed change omits common building sand and gravel, also omits Ashland, Augusta, Limestone, Olive Hill and Silica, Ky., as origins, allowing class rates to apply in lieu of present commodity rates.

22192. To establish on **rubble stone,** carloads, minimum weight per note 1 of Canadian National Building Material Tariff C. D. 53, from Cordova, Ont., to Lansing, Mich., rate of 21½c. Route—Canadian National Grand Trunk Western. Present rate, sixth class, 40½c, minimum weight as per consolidated freight classification.

22228. To establish on **molding sand,** minimum weight marked capacity of car, Bear Creek and Vandalia, Ill., to Connersville, Ind., rate of 202c per net ton. Present, rate, 252c per net ton.

22229. To establish on **fluxing stone,** in open-top cars, minimum weight 90% of marked capacity of cars, except when loaded to full visible capacity actual weight will govern, from Bedford-Bloomington, Ind., stone district to Lima, O., rate of 190c per gross ton. Present rate, 239c per gross ton.

22230. To establish on **fluxing stone,** in open-top cars, minimum weight 90% of marked capacity, except when loaded to full visible capacity actual weight will govern, from Bedford-Bloomington, Ind., stone district to Mansfield, O., rate of 224c per gross ton. Present rate, 239c pet gross ton.

22231. To establish on **broken stone,** carloads, in open-top cars, minimum weight 90% of marked capacity, except when loaded to full visible capacity actual weight will govern, from Bedford-Bloomington, Ind., stone district to Port Huron, Mich., rate of 260c per net ton. Present rate, 310c per net ton.

22239. To establish on **lime, agricultural or fluxing,** having no commercial value for chemical or building purposes, from Genoa, Luckey, Martin and Marblehead, O., to Cincinnati, O., minimum weight 30,000 lb., same rates on interstate traffic as are in effect on Ohio state traffis as shown below:

	To Cincinnati, O.			
	Present rates		Proposed rates	
From	Inter-state	Ohio state	Inter-state	Ohio state
Genoa, O.	None	11	11	11
Martin, O.	None	11	11	11
Marblehead, O.	None	11	11	11
Luckey, O.	None	11	11	11

22240. To establish on **blocks, building** (solid, hollow or perforated), made of cement or concrete or concrete cinder (not reinforced with metal), except enameled, individual blocks, not being packed, carloads, minimum weight 60,000 lb., from Kalamazoo, Mich.:

To	Proposed (Per net ton)	Present (6th class)
Adrian, Mich.	210	16
Hillsdale, Mich.	180	14

22249. To publish in Southern Ry. general commodity tariff No. 1225G, I. C. C. No. C2126, rate of 11½c on **lime,** carloads, from Milltown and Marengo, Ind., to Lawrenceville, Ill., applicable via Southern Ry., Mt. Carmel, Ill., and C. C. C. & St. L. Ry. Present rate, 12½c.

22250. To cancel commodity rate of 50c per net ton on **sand and gravel,** carloads, Fort Jefferson, O., to Lewisburg, O.

22272. To establish on **crushed stone, crushed stone screenings, agricultural limestone or agricultural limestone screenings,** from Kenton, O., rate of $1 per net ton, and from Marion, O., rate of 90c per net ton to Solon, O. Present rates—From Marion, O., $1 per net ton, and from Kenton, O., to Solon, O., $1.10 per net ton.

22275, cancels W. D. A. 22228. To establish on **molding sand,** carloads, minimum weight marked capacity of car, from Bear Creek and Vandalia, Ill., to Connersville, Ind., rate of 202c per net ton. Present rate, 22c per net ton.

22280. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica), and **gravel,** carloads, from Attica, Ind., to Fickle, Ind., rate of 90c per net ton. Present rate—Classification basis. Route—Wabash Ry., Lafayette, Ind., and N. Y. C. & St. L. R. R.

22281. To establish on **crushed stone,** carloads, from St. Paul, Ind., to destinations shown below, following rates. Present and proposed rates to Indiana points:

To	Pres.	Prop.	To	Pres.	Prop.
Longnecker	85	104	Metamore	95	110
New Trenton	85	104	Laurel	100	113
Ashby	90	105	Alpine	100	113
Cedar Grove	90	105	Nulltown	105	113
Brookville	95	110	Connersville	105	113
Yellow Bank	95	110			

22282. To cancel present commodity rates on **sand,** viz., blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding or silica, carloads, from Jeffersonville and New Albany, Ind., and Louisville, Ky., to Martinsville and Gosport, Ind. Present rates—From Jeffersonville and New Albany, Ind., 151c per net ton; from Louisville, Ky., 164c per net ton.

22284. To establish on **gypsum rock,** carloads, crude, crushed (not ground) and run of mine, minimum weight 90% of marked capacity of car, as at present, from Alabaster and National City, Mich.

22288, cancels W. D. A. 21772—To make the following changes in rates on cement, carloads, from Kosmosdale, Ky., as published in C. F. A. L. Tariff 399E; (a) to establish a rate of 14c per 100 lb. to Portsmouth, O., in lieu of present rate of 12½c per 100 lb.; (b) to establish a rate of 15½c per 100 lb. to Fair Oaks, O., in lieu of present rate of 16½c per 100 lb.; (c) to establish a rate of 13c per 100 lb. to Cuba, O., in lieu of present rate of 15½c per 100 lb.; (d) to establish a rate of 13½c per 100 lb. to Ohio City, O., in lieu of present rate of 11½c per 100 lb.; (e) to establish a rate of 15½c per 100 lb. to Mackinaw, Ill., in lieu of present rate of 13c per 100 lb.

22290. To establish on **rip rap stone,** carloads, minimum weight 90% of marked capacity of car, except when car is loaded to full cubical or visible capacity actual weight will apply, from Joliet, Ill. Rates in cents per net ton.

To	Pres.	Prop.
Michigan City, Ind.	270	95

22291. To establish on **sand and gravel,** carloads, from Urbana, O., to Ada, O., rate of 95c per net ton. Present rate, sixth class.

22292. To establish on **sand and gravel,** carloads, from Indianapolis, Ind., to Pendleton, Ind., rate of 65c per net ton. Present rate, 70c per net ton.

22194. To establish on **crushed stone,** carloads, Lewisburg, O., to Aurora, Ind., rate of 105c per net ton. Present rate, sixth class.

22196. To establish on **crushed stone** and crushed stone screenings, carloads, Dunkirk, O., to Guysville, O., rate of 135c net ton. Present rate, sixth class. Route—N. Y. C. R. R.-B. & O. R. R.

22197. To establish on **gravel and sand,** carloads, Dresden, O., to Warsaw Jct., O., rate of 60c per ton. Present rate, 80c per net ton.

22198. To establish on **sand and gravel,** carloads, Randles, O., to Byesville, O., rate of 85c per net ton. Present rate, 95c per net ton.

22199. To establish on **sand** (all kinds) and **gravel,** carloads, Massillon, O., to New Philadelphia, O., rate of 70c per net ton. Present rate, 80c per net ton.

22200. To establish on **sand,** carloads, from Evansville, Ind., and points taking same rates, as specified in Southern Ry. Tariff No. 900, I. C. C. No. C2047, to Richmond, Ind., rate of 188c per net ton. Present rate, 202c per net ton.

22210. To establish on **sand,** molding, and all other high grade sands, carloads, from Coalton group, Enterprise group:

To Richmond, Ind. Proposed rate in cents per net ton, 188. Via routes 1-3-4-6. Present rate in cents per net ton, 227.

To Cottage Grove, Ind. Proposed rate in cents per net ton, 188. Via routes 2-3-5-6. Present rate in cents per net ton, 214.

ENTERPRISE GROUP

Route No. 1—H. V. Ry., Columbus, O., and Penn. R. R. (west).

Route No. 2—H. V. Ry., Wellston, O., and B. & O. R. R. (west).

Route No. 3—H. V. Ry., Columbus or Athens, O., B. & O. R. R. (west), Cincinnati, O., and C. & O. Ry.

COALTON GROUP

Route No. 4—H. V. Ry., Columbus, O., and Penn. R. R. (west).

Route No. 5—H. V. Ry., Wellston, O., and B. & O. R. R. (west).

Route No. 6—H. V. Ry., Dundas, O., B. & O. R. R. (west), Cincinnati, O., and C. & O. Ry.

22211. To established on **stone, crushed,** in bulk, in open top cars, Cedarville, O., to following N. & W. Ry. stations in Ohio. Rates in cents per net ton.

To	Pres.	Prop.	To	Pres.	Prop.
Newtown	300	95	Mt. Oreb	340	105
Perintown	330	95	Sardina	340	105
Batavia	330	100	Macon	340	115
Afton	330	100	Winchester	340	115
Williamsburg	340	100	Seaman	340	115
Eastwood	340	105			

22219. To establish on **sand and gravel,** carloads, Spaulding and Munger, Ill., to Porter, Crocker, McCool and Hobart, Ind., rate of 65c per net ton. Present rates, 88c per net ton.

SOUTHWESTERN FREIGHT BUREAU DOCKET

17896. **Limestone,** from points in Missouri and Kansas to Henryetta, Okla. To establish a rate of 8c per 100 lb. on crushed or ground limestone, carloads (See Note 1), but not less than 60,000 lb., except when cars are loaded to full visible capacity, in which case actual weight will govern, from: Alba, Mo., Asbury, Mo., Atlas, Mo., Aurora, Mo., Baxter Springs, Kan., Bennetts, Kan., Carthage, Mo., Fort Scott, Kan., Galena, Mo., Granby, Mo., Joplin, Mo., Lehigh, Mo., Myers, Mo., Neck City, Mo., Orongo, Mo., Porto Rico, Mo., Prosperity, Mo., Purcell, Mo., Truce, Kan., Waco, Mo., Webb City-Carterville, Mo., to Henryetta, Okla. Shippers state that they are unable to sell their products at Henryetta, Okla., on basis of the present rate.

17976. **Lime,** from Mosher and Ste. Genevieve, Mo., to Munising, Mich. To establish a rate of 30c per 100 lb. on lime (calcium), common, hydrated, quick or slaked, carloads, minimum weight 60,000 lb., from Mosher and Ste. Genevieve, Mo., to Munising, Mich. Interested shippers request establishment of a through commodity rate on this traffic and the Western Trunk Line Committee has

docketed for consideration the question of establishment of a rate of 30c per 100 lb. on lime, minimum weight 60,000 lb., from and to the points outlined above.

17990. **Pumicite,** from Fowler, Kan., to Pensacola, Fla. To establish a rate of 37c per 100 lb. on pumicite (volcanic ash), carloads, minimum weight 80,000 lb., from Fowler, Kan., to Pensacola, Fla., for coastwise movement. The present rate, which is Class D, it is stated, is prohibitive.

17918. **Plaster,** from El Dorado, Okla., to points in Oklahoma. To establish the following rates in cents per 100 lb. on plaster and articles taking same rates, carloads, as described in St. L.-S. F. Ry. Tariff No. 1489, from El Dorado, Okla., to points in Oklahoma shown below:

To	30,000	40,000
El Reno	20½	14½
Oklahoma City	20½	14½
Enid	20½	18½
Shawnee	20½	18½
Alva	20½	18½
Ponca City	20½	18½
Tonkawa	20½	18½

It is stated that the present rate situation places El Dorado, Okla., at a disadvantage and in this particular instance it is proposed to establish from El Dorado, Okla., the same rates as are applicable from Sweetwater, Tex.

17921. **Agricultural limestone,** from Weldon Springs, Mo., to points in Missouri. To amend Item 1105-S of W. T. L. Tariff No. 91-F applying on agricultural limestone to points in Missouri by adding Weldon Springs, Mo., as a point of origin. Shipper claims present rate is prohibitive and asks that Weldon Springs be placed on the same basis as Elsberry, Hannibal and other points named in this item with which he has to compete.

17926. **Lime,** from Glencoe and Glen Park, Mo., to points in Oklahoma. To establish a rate of 29½c per 100 lb. on lime (calcium), common, hydrated, quick or slaked, carloads, minimum weight 30,000 lb., from Glencoe and Glen Park, Mo., to Tulsa, Tulsa Exposition Grounds and Sand Springs, Okla. The rate of 29½c is now published from St. Louis in Item 6726, S. W. L. Tariff 15-N, and as Glencoe and Glen Park, Mo., are both intermediate to St. Louis, it is desired to establish the same rates from these stations.

17930. **Sand and gravel,** from Memphis, Tenn., and Levesque, Ark., to West Memphis, Ark. To establish a rate of 62c per ton of 2000 lb. from Memphis, Tenn., to West Memphis, Ark., and a rate of 68c per ton of 2000 lb. from Levesque, Ark., to West Memphis, Ark., on sand, except asbestos sand and silica sand; gravel; in straight or mixed carloads. Minimum weight 80,000 lb., or if marked capacity of car is less than 80,000 lb. marked capacity will govern. The above adjustment is for the purpose of giving shippers the benefit of reducing rates prescribed in I. C. C. Docket 17000, Part 11, for the distance of 11.4 miles over the Mo. Pac. R. R. in connection with the reduced bridge toll.

17931. **Sand,** from Shirk, Okla., to points in Missouri. To establish a rate of 7c per 100 lb. on sand, carloads, minimum weight 90% of marked capacity of car, from Shirk, Okla., to Wheaton and Ridgley, Mo. Shippers state that the present rate is unreasonably high and that the proposed rate, which is the 9702 scale for the distance, is reasonable and proper.

17942. **Lime,** from Springfield, Mo., to points in Oklahoma. To establish a rate of 34c per 100 lb. on lime, carloads, as described in C. R. I. & P. Ry. Tariff 16706G, minimum weight 30,000 lb., from Springfield, Mo., to C. R. I. & P. Ry. stations, Baker, Adams, Hardesty and Hitchland, Okla. The C. R. I. & P. has constructed a new line between Liberal, Kan., and Amarillo, Tex. The stations shown are located on this line in Oklahoma and it is very important that rates be published as soon as possible.

NEW ENGLAND FREIGHT ASSOCIATION DOCKET

17227. **Sand, building, common or run of bank** (See Note 2), from Stanfordville, N. Y., to La Grange, N. Y. Present rate, 11½c; proposed, 70c per net ton. Reason—To meet motor truck competition.

17228. **Stone, broken or crushed,** in bulk in gondola or other open top cars (See Note 3), to Worcester, Mass. Rates per net ton:

From	Pres.	Prop.
Branford (Pine Orchard Quarry), Conn.	$1.35	$1.10
E. Wallingford (Reed's Gap Quarry), Conn.	1.25	1.10
New Britain (Cook's Quarry), Conn.	1.25	1.10
Rocky Hill, Conn.	1.20	1.20

Reason—To correct an error made by withdrawing the proposed rates from the tariff.

17302. (a) **Sand, run of bank;** (b) **gravel, screenings,** from Auburn, Mass. Present rates—To Worcester, Mass., (a) 70c, (b) 85c per net ton. To Princeton, (a) 10½c per 100 lb., (b) 10½c per net ton. Proposed—To Worcester, Mass., 50c per net ton; to Princeton, Mass., 120c per net ton. Reason—To meet motor truck competition.

17380. **Feldspar,** ground, from Middletown, Conn., to Lansdale, Penn. Present rate, 27c; proposed, 18c. Reason—To establish rate from Middletown comparable with rates from Keene, N. H.

17381. **Rock, silica and sand, silica,** from Norwich, Conn., to Trenton, N. J. Present rate, 22½c; proposed, 28½c. Reason—To cancel obsolete commodity rate.

17395. **Stone, crushed,** from Branchville, Conn., to Jones Point, N. Y. Present rate, 16c; proposed, 18½c. Reason—Cancellation of obsolete commodity rate.

17398. **Crushed stone,** minimum weight, in bulk in gondola or other open cars, 90% of marked capacity of car, except when cars are loaded to cubical or visible capacity actual weight will apply, from Westfield, Mass., to Central Village, Conn. Present rate, $1.25 per net ton; proposed, $1.10 per net ton (to expire November 30, 1929, unless sooner canceled, changed or extended). Reason—To establish rate from Westfield, Mass., comparable with rates from Branford, Conn.

17413. **Gravel,** to Jones Point, N. Y., from Branchville and Long Hill, Conn. Present rates, 16c; proposed, 18½. Reason—Cancellation of obsolete commodity rate.

17345. **Sand,** fire, minimum weight 90% of the marked capacity of car, from Onset, Mass., to Dexter, Me. Present rate, 26½c; proposed, 17½c. Reason—To provide commodity rate on same basis as rates now in effect from and to other points.

New England Cement Rates

ANOTHER effort has been made, in a report written by Commissioner Farrell, in No. 18112, Atlas Portland Cement Co. vs. Central of New Jersey et al., opinion No. 14682, 155 I. C. C. 60137, to adjust rates from the Lehigh and Hudson cement producing districts into New England that will produce peace and stability in a rate structure that has been a cause of trouble for many years. The commission has found the present rates unreasonable to the extent they will exceed rates made in accordance with a scale which, it is believed, will cause the carriers to lose revenues. In addition the scale is expected to increase the spread between Hudson, N. Y., on the one hand, and the Lehigh district, on the other, to a considerable part of New England and reduce it to a smaller figure to a lesser part of New England. As between the two districts, instead of as between Hudson, N. Y., and the whole Lehigh district, the impression is that the spread has been increased somewhat to the advantage of the Hudson district.

Rates in accordance with the scale have been ordered to be published not later than September 16, based on a minimum of 50,000 lb., subject to the marked capacity of the car, but not less than 40,000 lb. The distances are to be computed via existing connections for the interchange of traffic. The scale is to be used in making rates to all points in New England except destinations north and east of a line drawn through Rockland, Albion, Waterville, Oakland, Farmington and Rumford, Me. To that territory differentials over the rates made by the scale are to be applied for the benefit of the carriers having the hauls, the differentials to be for their benefit, in addition to their customary divisions.

The rates from the Hudson district, the report says, should be computed on the actual distances for hauls of 60 miles and less. For hauls greater than 60 miles the rates are to be computed on the basis of the average distance from Hudson, Hudson upper, Alsen, Glens Falls and Howe's Cave, N. Y. The report also says that rates based on the scale should also be established from the Atlantic ports, from Rockland, Me., and from Troy and Beacon, N. Y.

Although this is a general readjustment, in which reparation is generally denied, one award of reparation is made. It is in No. 18744, Glens Falls Portland Cement Co. vs. Boston & Albany.

In substance, although not altogether in form, the case to which the Commission gave the name New England Cement Rates, was a contest between the Hudson district lying on both sides of the Hudson River, in New York, and the Lehigh district in western New Jersey and eastern Pennsylvania. The contest was not wholly one of relationship because allegations of unreasonableness, as well as undue prejudice, were made. The Commission decided that the rates were unjust and unreasonable, for the future only, except in the Glens Falls case, in which that finding was also made as to rates in the past.

Four findings were made, first, as to the rates from Glens Falls in the past; second, as to the rates from that place for the future; third, as to the rates from both districts; and fourth, as to the rates in differential territory in Maine.

In 1918, the Commission prescribed what was known as the Troy scale in connection with its report in Allentown Portland Cement vs. B. & O., 49 I. C. C. 502. The order in that case is still outstanding. It has, however, been modified so as to permit the making of rates in accordance with the prescribed scale, in cents, per 100 lb., which follows:

Distance	Rate, Cents
5 miles and less	5
10 miles and over 5	6
20 miles and over 10	7
30 miles and over 20	8
40 miles and over 30	9
50 miles and over 40	9.5
60 miles and over 50	10
70 miles and over 60	10.5
80 miles and over 70	11

For each successive increment of 15 miles or part thereof, an increase of 0.5 cents per 100 lb. is prescribed until the distance is 290 miles and over 275 (the rate here being 18 cents), the increment or part thereof has over 20 miles with a like increase of 0.5 cent per 100 lb. per increment; the final prescription becomes 810 miles and over 790, rate 31 cents per 100 lb.

The differential scale follows:

Distance, Miles	Differentials, Cents
25 and under	2
50 and over 25	3
100 and over 50	3.5
200 and over 100	4
300 and over 200	4.5
Over 300	5

—*Traffic World.*

Superior Company to Open Gravel Plant

THE RECENTLY organized Superior Sand and Gravel Co., De Kalb, Ill., has leased 40 acres on the Dettmer Brothers farm near De Kalb, which will be developed. Washing and screening equipment is already in place and excavation at the pit just started. Storage bins have been erected.

The company is planning for truck shipments of gravel to the dealers, one truck for this purpose already being in use.

The incorporators of the company are P. W. Fisk, J. C. Killian and T. E. Courtney. John Powers is in charge of operations.—*De Kalb* (Ill.) *Chronicle.*

Marquette Company's New Memphis Terminal Completed

THE NEW river terminal of the Marquette Cement Manufacturing Co. at the foot of Poplar Avenue will be placed in operation soon, F. L. Jaeger, manager of the Memphis plant, announced.

Cement will be brought here by barges from Cape Girardeau, Mo., packed into bags and distributed to all parts of the South. Four new self-unloading barges will be used for the transportation of the bulk cement, towed by a chartered towboat. The Marquette company is having a large towboat built for its own use and it will be completed next year. A similar terminal plant is being erected in St. Louis to facilitate distribution.—*Memphis* (Tenn.) *Commercial-Appeal.*

Iowa Company Enlarges Plant

TWO NEW dredging units and a new washing plant have been installed by the Iowa Sand and Gravel Co. at its plant on the Des Moines river near Eddyville. The expansion has increased the capacity of the plant to 50 cars a day.

Both new dredges are electrically operated, one by a 250 hp. motor and the other uses a 200 hp. motor. They are both equipped with Swintek cutting nozzles. The new shore washing plant is operated by a 150 hp. electric motor. An older plant about one mile from the new plant is used for recleaning the sand and gravel.—*Oskaloosa* (Iowa) *Herald.*

Florida Portland to Make Plant Improvements

THE HOOKER'S Point mill of the Florida Portland Cement Co. will close down for a few weeks to allow repair work to proceed, according to an announcement by F. M. Traynor, vice-president of the company. Orders for cement will be filled from storage until the repair work, chief of which is the installation of a new set of tubes in the power house condensers, is completed.

The Tampa plant, which started operation October 12, 1927, has been operated continuously except for a shutdown last summer, during which time everything was put in shape for another year's operation. When operation is resumed, at least two of the three kilns will be placed in operation continuously for the rest of the year.

The plant employs 125 workmen, and not a man will be laid off. All will be kept busy on the work of overhauling.—Tampa (Fla.) *Tribune.*

Calaveras Cement Increases Storage Facilities

INSTALLATION of large additional storage facilities for both stone and clinker and construction of five more concrete silos for the storage of finished cement have more than doubled the storage capacity of the plant of the Calaveras Cement Co. near San Andreas.

Blasting in the second branch in the quarry, it is also reported, has made available limestone sufficient to run the mill for several months without additional blasting. The quarry is located a quarter of a mile from the plant.—*Los Angeles* (Calif.) *Express.*

Building New Gravel Plant

T. L. WRIGHT Lumber Co., Doniphan, Mo., is erecting a new gravel plant to take care of increased orders. The new plant will be equipped with a 2-cu. yd. Sauerman cableway excavation, and will make the third plant operated by the company.

The Wright company recently received a contract for 33,000 cu. yd. of gravel from the Arkansas highway commission, shipments to start early in August.—*Doniphan* (Mo.) *Republican.*

San Antonio Wins Fight for Use of Domestic Cement

THE J. DE PUY Construction Co. of San Antonio, Texas, has agreed to use American cement only for the construction of the municipal sewage disposal plant, notwithstanding the fact that it had purchased 6000 bbl. of Belgian cement for the purpose. The controversy over the use of Belgian cement in the work has been going on for some time (see ROCK PRODUCTS, July 20 issue, p. 75). Domestic manufacturers of cement protested against the use of Belgian cement, and they were supported in this protest by Mayor C. M. Chambers and the other members of the city administration. The de Puy company sought through court proceedings to enforce the proposal to use the foreign cement. The case has been, however, indefinitely postponed, and the company has given assurance to the city that only American cement will be used.

Midway Company Sold by Sheriff

PLANT and leasehold estate of the Midway Sand and Gravel Co. at Gravel Bank, Ohio, was sold at sheriff's sale recently. The sale was in foreclosure to satisfy three judgments recently taken by the Central Bank and Trust Co. and the First National Bank, both of Parkersburg, W. Va.

The three judgments total $33,450.05 and the property sold was appraised at $8900. Representatives of the two Parkersburg banks were the only bidders and they acquired the property for two-thirds of the amount of the appraisal, or $5934.—*Marietta* (Ohio) *Times.*

State College to Offer Courses in Rock Products

THE NONMETALLIC minerals and their processing are the subjects of study in the recently added department of mining engineering, North Carolina State College. Emphasis is placed on the rock products because of the large supplies of these materials located in the state and the absence of mineral ores such as gold, silver, zinc, lead, etc.

As the world's largest deposits of the nonmetallics are located in the southern states and as they are only now beginning to be developed, the possibilities and prospects for nonmetallic mining specialists loom large.

Prof. A. F. Greaves-Walker, acting head of the new department, states that a great deal of interest has been created in the course, not only in North Carolina, but in other states.—*Charlotte* (N. C.) *Observer.*

U. S. Steel Corporation's Limestone and Cement Output

THE REPORT of the United States Steel Corp. for the year 1928 gives the following figures of raw materials and finished products:

Limestone quarried	14,600,181 tons
Cement	14,957,000 bbl.

Recent Contract Prices

Mobile, Ala.—The Mobile county highway department has awarded the following contracts:

Richton Investment Co.—Bid of $1.25 per ton for sand and $1.60 for gravel, delivery to be at Orchard and Crest Cemetery road.

Hattiesburg Gravel and Sand Co.—Bid of $1.62 per ton for sand and $2 per ton for gravel, delivery to be made at Dawes road; acceptance is subject to approval of the county engineers of the plant and facilities.

Mobile Gulf and Navigation Co.—Bid of $1.30 for sand and $1.40 for gravel, delivery to be made at Telegraph.

Montgomery Sand and Gravel Co.—Bid of $1.40 per ton for sand and $1.95 per ton for gravel, delivery to be made at Prine road.—*Mobile* (Ala.) *Register.*

Cement Industry Sets Up New Safety Record Thus Far in 1929

First Half of Year Far Ahead of Previous Showings

By A. J. R. Curtis
Assistant to General Manager, Portland Cement Association

ALL who are interested in the progress of the cement industry will be delighted again to learn of further significant reductions in mill accidents during the last semi-annual period. New and surprisingly reduced figures are revealed in studies covering the first half of 1929. Although those who have been following closely the safety work in the cement mills have been wondering for some time how long the present downward trend in accident frequency could

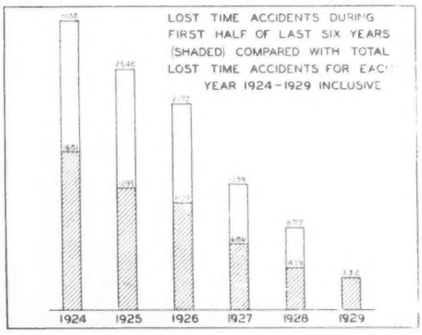


Fig. 1. Comparison of lost-time accidents during first half of last five years, with total lost-time accidents each year

continue, latest statistical information shows that for the present at least there is no letup. On the other hand, the slight increase in accident severity, as noted several months ago by a slight increase in fatalities, continues, although with less dangerous indications.

During the first half of 1929 the 131 plants reporting suffered a total of 332 lost-time accidents as compared with 439 lost-time accidents suffered in 136 plants during the first half of 1928. Disregarding the difference in the number of mills reporting, there was an actual reduction of 107 accidents, or 24%. An interesting comparison

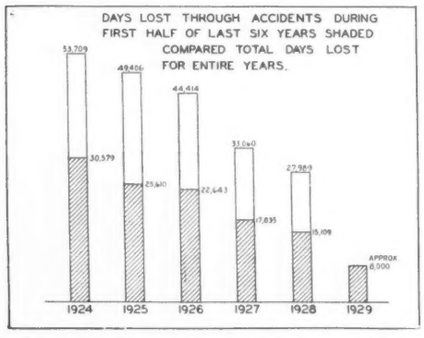


Fig. 4. Comparison of total number of days lost in connection with accidents indicated in Fig. 1

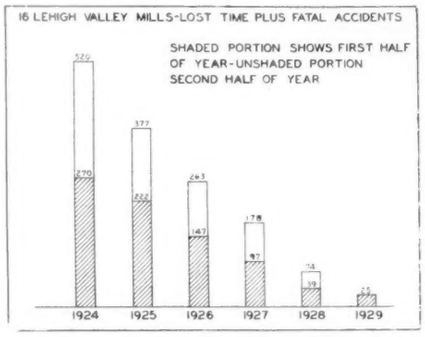


Fig. 2. Comparison of lost-time accident totals for group of 16 mills in the Lehigh Valley region

of the record for the first half of each year since 1924, with the year's total, is given in Fig. 1.

A similar comparison of fatal accidents for the same period is shown in Fig. 3. This table illustrates the very persistent nature of our fatal accidents. During the past 29 months fatal accidents have shown a tendency to increase, and have done so, although the number suffered was undoubtedly reduced greatly by vigorous preventative measures. It is believed that we have been riding the crest of a reactionary wave in which a number of increased hazards, due to construction, rebuilding and new mills placed in operation were large factors.

Fig. 4, comparing the total number of days lost as a result of the lost-time accidents shown in Fig. 1, is equally interesting. By multiplying any of these figures by the daily wage rate, the enormous wage loss of the accidents to the workmen is apparent. Perhaps the most interesting of the series is Fig. 5, showing the increasing number of mills to operate without accident each year since 1924, and the relative proportion to the total number of mills reporting each year.

Prior to 1924 no mill had operated from January 1 to June 30 of any year without recordable accident; in 1924 two mills, constituting 1.9% of the total number reporting, finished the first half of the year without mishap. Five years later, in 1929, 61 mills, over 30 times as many as in 1924, constituting 40% of the total number in operation, finished the first six months without lost time, permanent disability or fatal accident. This is one of the most surprising features of cement mill safety progress.

That almost every department of mill and quarry operation has contributed to the remarkable showing is apparent from Fig. 6. A number of large departments having many potential hazards have improved noticeably since last year, and no large department has

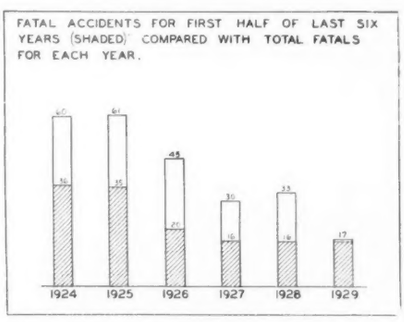


Fig. 3. Comparison of fatal accidents similar to that shown in Fig. 1

fallen seriously behind. Quarry mishaps have proven quite numerous and persistent, and unless subjected to prompt and effective corrective measures the quarries seem likely to suffer a somewhat larger proportion of the total accidents this year than last. Fig. 7 shows the relationship of various department records during the five-year period 1924-1928 and indicates clearly that, generally speaking, accident prevention measures now in use in the industry are taking hold with about the same success in these different and quite dissimilar departments.

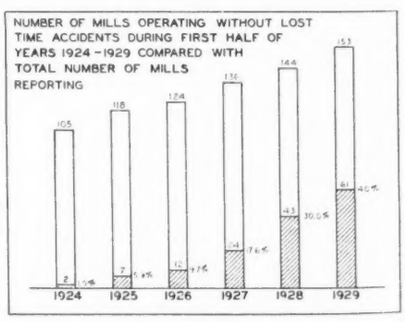


Fig. 5. Mills operating without accidents have increased greatly in actual number and in proportion to the total

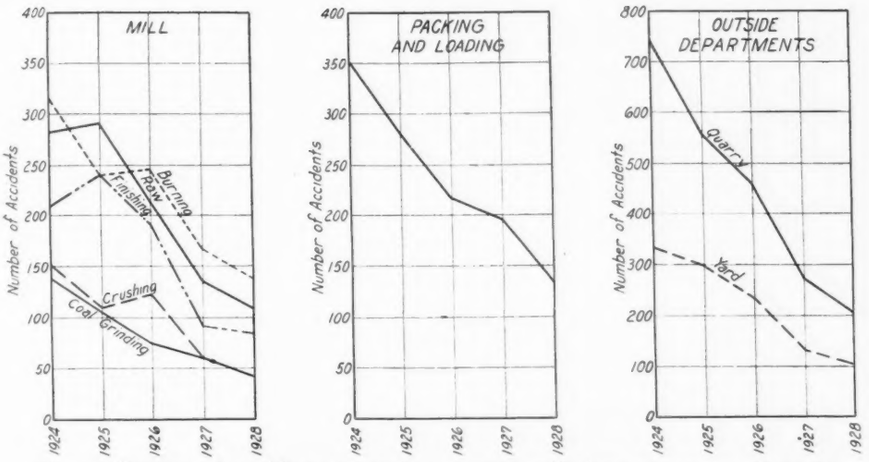


Fig. 7. Decline of accidents in various cement mill departments as shown by annual totals, 1924 to 1928, inclusive

Another typical evidence of progress shows the record of 16 cement mills in the Lehigh Valley district, as shown in Fig. 2.

June Campaign Results

June, the closing month of the last semi-annual period, broke all records for the reduction of accidents. With more mills operating and reporting their accidents than at any previous time, accident reports dwindled below any previous monthly count by at least 10%. In the June no-accident cam-

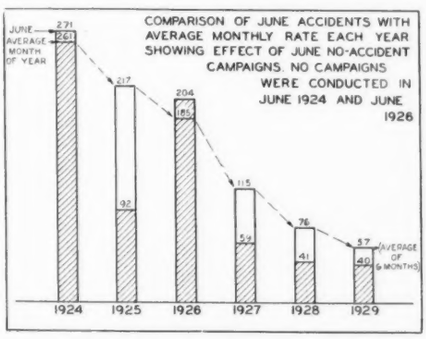


Fig. 8. Diagram indicating effect of June "No-Accident" campaign on June accidents

paign held during the month, 136 plants, 85% of the 159 participating, operated throughout the month without so much as a single lost-time accident. Twenty-three mills suffered 40 accidents.

Last year, during the progress of the June special campaign, 124 mills avoided accidents, while 27 mills suffered one or more accidents each, a total of 51. In the annual report of the Portland Cement Association covering accident frequency, which includes only the 136 mills furnishing the complete statistical data required, there is shown a total of only 42 lost-time and fatal accidents during June of last year. On the same basis, the 1929 statistics of the association should show only about 36 accidents of these classes.

Revised monthly frequency figures for the first half of 1929 are compared above:

TOTAL RECORDABLE ACCIDENTS

	*1929	1928	1927	1926	1925
January	59	63	133	197	249
February	51	76	108	183	232
March	46	91	140	198	252
April	73	101	152	171	236
May	75	82	110	174	234
June	40	42	59	204	92
Half-year total	344	455	702	1127	1295

*1929 figures are gross totals. Other years are net totals, including only figures for mills reporting both man-hour and accident statistics.

A comparison of the records for the June campaigns of 1928 and 1929 gives the following interesting information:

	June 1929	June 1928
Mills enrolled	159	153
Gross recordable accidents	40	51
Gross lost-time accidents	36	50
Gross fatal accidents	4	1
Mills suffering 8 accidents	0	1
Mills suffering 6 accidents	0	1
Mills suffering 5 accidents	1	1
Mills suffering 4 accidents	2	0
Mills suffering 3 accidents	1	1
Mills suffering 2 accidents	2	4
Mills suffering 1 accident	17	21
Mills suffering no accidents	124	136

The disappointing feature of the campaign was the three fatal accidents, against one each in June, 1927, and June, 1928. Of this number one was suffered by a mill whose record does not appear in our annual tabulation.

June accidents classified by departments are shown as follows:

NUMBER OF ACCIDENTS, JUNE, 1929, BY DEPARTMENTS

Quarries	12	Cement storage	0
Mines	0	Packing and shipping	4
Clay pits	0	Power	3
Crushing	3	Shops	4
Raw	2	Yards	3
Coal grinding	1	Other than above	1
Burning	1	Not given	5
Finishing	1		40

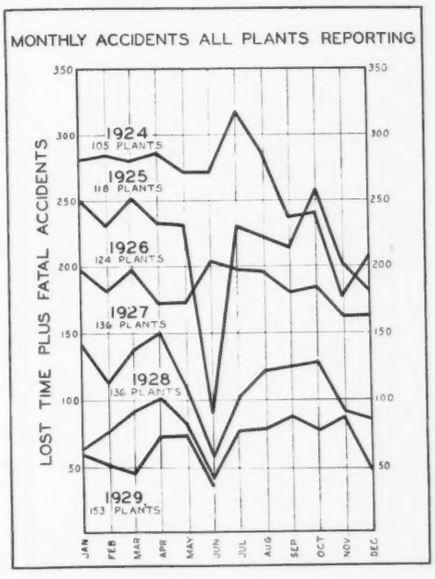


Fig. 9. Monthly accident frequency diagram for five-year period

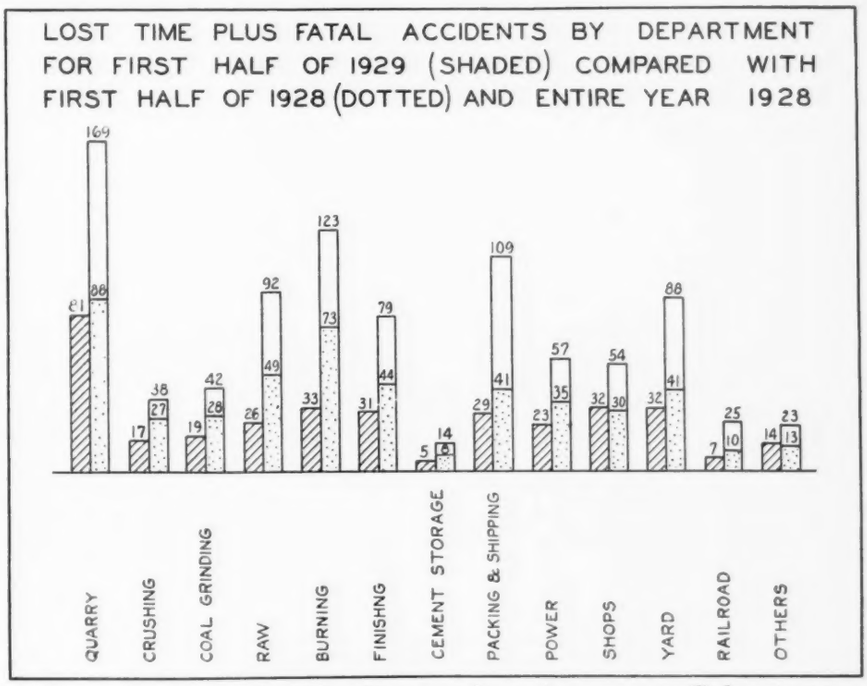


Fig. 6. Comparison of accident frequency for various cement mill departments for first half of 1928 and 1929 and year 1928

Cement Mills Hold Safety Meeting at Detroit

THE CEMENT mills of Michigan and Wisconsin and northwestern Ohio attended the annual regional safety meeting of the Portland Cement Association at Detroit on Tuesday, July 9. There was an attendance of 88. H. R. Browne, technical director of the Huron and Wyandotte Portland Cement companies, acted as general chairman and was assisted by John W. Kennedy, engineer in charge of the Huron-Wyandotte service bureau, and the superintendents of the participating mills. The program presented was as follows:

MORNING SESSION, 10 A. M.

Chairman, H. R. Browne

A Year's Progress in Safety Campaigns, A. J. R. Curtis, assistant to general manager, Portland Cement Association.

Introduction of Michigan Safety Trophy Winners.

Educating the New Employe in Safety, W. S. Smith, safety department, Ford Motor Co.

Safety as the Doctor Sees It, W. H. Honor, M.D., Wyandotte.

Safety's Relation to Production, J. A. Purdy, director of safety, Michigan Mutual Liability Co.

LUNCHEON, 12:30 P. M.

F. E. Town (superintendent, Manitowoc) presiding.

Shall We Three Meet?, H. O. Rounds, director of safety and traffic division, Detroit Automobile Club.

AFTERNOON SESSION, 2 P. M.

First Aid in Accident Prevention, J. F. Davies, supervising engineer, U. S. Bureau of Mines.

Timely Topics.

A. What Price Safety Trophy? C. H. Denman, chief chemist (Alpha), and W. F. Murray, general superintendent (Wolverine).

B. Electrical Hazards, W. M. Powell, safety director (Medusa), and W. G. MacDonald, electrician (Huron).

C. Quarry Accidents, W. J. McHenry, E. I. du Pont de Nemours and Co.

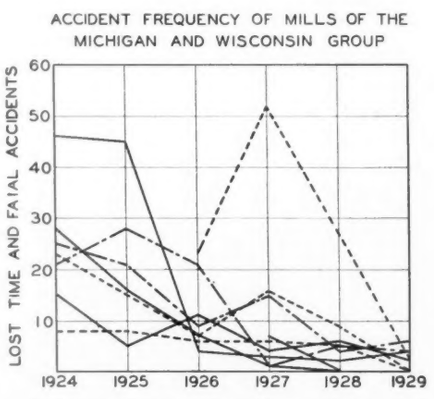
D. The Significant Accident Bulletin, A. G. Trexler, master mechanic (Newaygo), and F. E. Selfe, chief engineer (Consolidated).

E. The National Safety Council, F. E. Town (Manitowoc), chairman, cement section, National Safety Council.

DINNER, 6:30 P. M.

J. B. John (vice-president, Newaygo) presiding.

C. H. Denman (Alpha), song leader.



Accident records of mills in Michigan and Wisconsin group

Selections by Peerless Harmony Boys (Colored quartette from Detroit plant, Peerless-Egyptian Cement Co.)

Addresses by Rev. M. S. Rice, Metropolitan M. E. Church, Detroit; Edwin A. Goodwin, industrial safety director, Michigan Department of Labor and Industry; O. O. Stone, Michigan manager, Portland Cement Association.

Accident Records Compared

The analysis of the accident record of the Michigan-Wisconsin mills made by Mr. Curtis showed that this group have made a record which compares closely with the average for the country as a whole. The detailed figures were as shown in the following tabulation:

	Lost Time Plus Fatal Accidents					
	1924	1925	1926	1927	1928	*1929
Mill A	28	16	7	1	0	0
Mill B	21	28	21	1	5	4
Mill C	....	5	11	4	6	2
Mill D	....	....	23	52	30	2
Mill E	25	21	9	15	4	6
Mill F	46	45	4	3	2	4
Mill G	8	8	6	6	5	0
Mill H	23	15	7	16	9	0
Mill I	15	5	....	7	0	0
Total	166	143	88	105	61	18
No. reporting	7	8	8	9	9	9
Accidents per mill	24	18	11	11.7	6.8	4
Average per mill for entire association group	28.4	21.7	18	10	6.7	4.6

*First half.

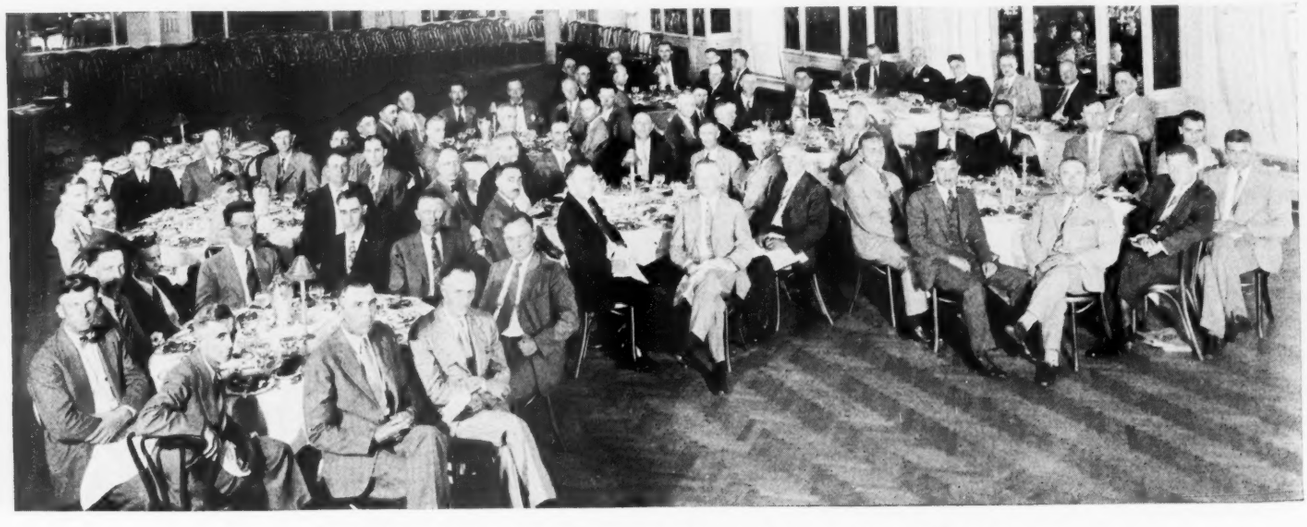
Two Michigan mills won Portland Cement Association trophies by operating during the year 1928 without lost time or fatal accident, and four mills in that group have suffered no accidents so far during 1929.

Training New Ford Employes

W. S. Smith of the safety department of the Ford Motor Co. spoke as follows on the handling of new employes at the Ford plants:

"Education is simply the appreciation of what we study and read in books and gain in experience. For example, we can give a man a complete set of rules on the safe operation of his job. He may be able to repeat every rule word for word, but unless he can fully appreciate the reason and value of each rule, then the education has been a failure.

"It has been truthfully said that safety work is 75% education and 25% mechanical.



Attending guests at the annual regional safety meeting at Detroit

Therefore, our efforts must be concentrated on the training and instruction of the employe. A leading safety engineer was once asked if he would prefer a plant with no guards on the machines and men who had education in safety, or a plant with guards on every available place and men untrained in safe operation. He at once favored the plant where safety education was established.

"No matter how much we protect our industry with mechanical devices, they are of very little avail unless the operator is trained, and our training must be thorough.

"The new employe is our greatest responsibility. I do not believe we realize just what it means to enroll a new man and put him to work. There are so many handicaps and small details that contribute to his danger:

"(1) The newness of his surroundings.
"(2) The anxiety of making a success of his new job resulting in an over-enthusiasm to rush in with no thought of danger.
"(3) He may have been out of employment for a considerable time and carry a lot of worry regarding his home and family.

Educational Activities Begin Upon Employment

"To overcome these handicaps the first step is to instruct the man as soon as he

H. R. Browne

reaches the employment office, thereby giving him confidence that his new field of activity is going to be among men who believe and practice safety.

"Safety bulletins on the wall and a card of welcome containing safety rules are practical samples of making the new surroundings appear welcome.

"Next, the employe should be examined as to his fitness to do work for which he is making application. This test, of course, should be physical as well as from the point of view of experience. There is no question of the hazard of putting a man on the job for which he is mentally and physically unfit.

"Providing he meets all the requirements of experience and has received the preliminary instructions in safety, his road is more

F. E. Town

or less easy and supervision in safety work should do the rest.

"The following are a few samples of educational activities which will help in training the new employe:

"(1) Bulletins in employment office.
"(2) Safety cards outlining general safety rules.
"(3) Instructions by foremen.
"(4) Set of safety rules governing his job.
"(5) Safety moving pictures.
"(6) Safety committee man in his department.
"(7) Personal talk by safety engineer.

"Practical demonstration of safety equipment and application of rules are among the most effective methods of convincing the new man. There is no use lecturing and wandering into paths of theory and rhetoric unless we get down to earth and show the man by demonstration that our ideas and equipment will protect him."

Resolutions

During the afternoon session the following resolutions, proposed by F. E. Town (superintendent, Manitowoc), were unanimously adopted:

"Representatives of the cement mills of Michigan, Wisconsin and northwestern Ohio, assembled in their annual safety meeting on Tuesday, July 9, at Detroit, extend hearty congratulations to Major H. A. Reninger, president of the National Safety Council, and his able and willing staff of safety workers on their splendid accomplishments and pledge full support and cooperation to them in their aims to extend the good work.

"We recognize in the National Safety Council an organization of rare and refreshing effectiveness and recommend full affiliation to every industrial concern which does not now hold membership."

The second resolution referred to the untimely death of Russell Frame, safety director of the Alpha Portland Cement Co.

Dinner Enjoyable Affair

The annual safety dinner of the Michigan, Wisconsin, Ohio group proved an enjoyable affair. J. B. John, vice-president of the Portland Cement Association and chairman of its committee on accident prevention, acted as toastmaster.

Mr. John paid high tribute to the safety work of the industry and traced the progress through the years of uncertainty preceding the establishment by the association of an organized system of regional meetings where accident prevention subjects are studied.

The regional safety meetings have proven an unqualified success, according to Mr. John, and the association must throw the full force of its prestige and resources behind them.

Edwin A. Goodwin, director of industrial safety, Michigan State Department of Labor and Industry, was a most interesting speaker who discussed the efforts of his department along lines parallel to those followed by the

J. W. Kennedy

Portland Cement Association. Mr. Goodwin easily convinced his listeners that the state safety work was very capably managed and in every sense co-operative with industry.

Other speakers were Rev. M. S. Rice of Detroit and O. O. Stone, Michigan manager of the Portland Cement Association.

The attendance was as follows:

REGISTRATION LIST, REGIONAL SAFETY MEETING AT DETROIT

Alpha Portland Cement Co., Bellevue, Mich.
C. H. Denman, chief chemist.
George A. Lawniczak, superintendent.
Edward Sincox, packing foreman.

Consolidated Cement Corp., Cement City, Mich.
J. W. Blakely, stock clerk.
Marshall M. Mudge, chief electrician.
F. E. Selfe, chief engineer.
Don Snell, assistant chemist.
John Swarthout, foreman of dredging.

Huron Portland Cement Co., Detroit, Mich.
D. F. Jennings, service bureau.
John W. Kennedy, manager service bureau.
Charles E. Munch, shift foreman.
H. R. Schemm, assistant superintendent of plants.
P. H. Townsend.
H. J. Tubbs.
H. R. Browne, technical director.
S. T. Crapo, secretary-treasurer.
William W. Crapo.

Huron Portland Cement Co., Alpena, Mich.
G. R. Borland, foreman.
W. G. MacDonald, chief electrician.
P. H. Snell, assistant superintendent.
W. M. Smith, chief chemist.

Huron Portland Cement Co., Wyandotte, Mich.
R. L. Beal, chemist.
W. T. Bell, foreman.
H. A. Browne, superintendent.
J. A. Bezotte, pack house foreman.
D. M. Lachlan, captain transportation company.
E. C. Jacobson, superintendent.
George E. Liedtke, foreman.
Guy Morrison, foreman.
George B. White, employment manager.
John White, foreman.

Manitowoc Portland Cement Co., Manitowoc, Wis.
F. E. Town, superintendent.

Medusa Portland Cement Co., Cleveland, Ohio
W. L. White, Jr., general superintendent.
W. M. Powell, safety director.

Medusa Portland Cement Co., Toledo, Ohio
W. J. Worthy, superintendent.
Raymond E. Hagen, electrician.
Roy Hulstine, machine shop.
H. J. Krebs, repair foreman.
Ned Twining, repairman.

Medusa Portland Cement Co., Bay Bridge, Ohio
A. J. Little, superintendent.
Fred Brunner, marl field foreman.
Charles Fuchs, chief engineer.

Newaygo Portland Cement Co., Newaygo, Mich.
J. B. John, vice-president.
George Kritzer, assistant chemist.
E. J. Peterson, shipping clerk.
C. B. Robinson, electrician.
Arthur G. Trexler, master mechanic.

Peerless Egyptian Cement Co., Detroit, Mich.
W. L. Kaiser, superintendent.
L. L. Adams, master mechanic.
Ed Dalton, member construction department.
A. C. Eichenlaub, chief chemist.
J. J. Evans, millwright.
K. J. Havard, assistant superintendent.
Richard Labo, chief engineer.
C. R. Ludwick, packer.
A. M. Pluskat, secretary to superintendent.
John R. Stearns, pack house.
William W. Wideman, electrician.
J. W. Wilson, mill foreman.
Robert R. Young, assistant foreman, pack house.

Peerless Egyptian Cement Co., Port Huron, Mich.
A. A. Oesterle, superintendent.
William Gregory, foreman.
C. MacDermott, office.
Albert H. Stephen, chief electrician.
James R. Wellman, chemist.
E. C. Williamson, foreman.
Francis E. Young, coal department.

Petoskey Portland Cement Co., Petoskey, Mich.
H. H. Lucas, sales manager.
A. L. Campbell, timekeeper.
F. J. Mawby, mill foreman.
M. McMaster, chief electrician.
L. A. Platt, chemist.

Wolverine Portland Cement Co., Coldwater, Mich.
W. F. Murray, general superintendent.
Carl Addicker, night foreman.
H. Ray Zull, mechanical engineer.

Wolverine Portland Cement Co., Quincy, Mich.
John Mann, repair foreman.
Claude Paul, plant chemist.

Miscellaneous
A. J. R. Curtis, Portland Cement Association.
Joseph F. Davies, U. S. Bureau of Mines, Vincennes, Ind.
Edwin A. Goodwin, state safety director, Lansing, Mich.
R. J. Green, Southern Surety Co. of New York.
Dr. Honor, Wyandotte, Mich.
R. B. Murphy, Detroit Industrial Safety Council.
J. A. Purdy, director of safety, Michigan Mutual Liability Co.
H. O. Rounds, director of safety, Detroit Automobile Club.
Dr. St. Louis.
W. S. Smith, safety director, Ford Motor Co.
O. O. Stone, Portland Cement Association.

Manheim Plant Unveils Safety Trophy

Over 2000 People Gather for Ceremonies

THE Manheim plant of the Alpha Portland Cement Co., located in the northeastern part of Preston county, West Virginia, celebrated on July 6 the dedication

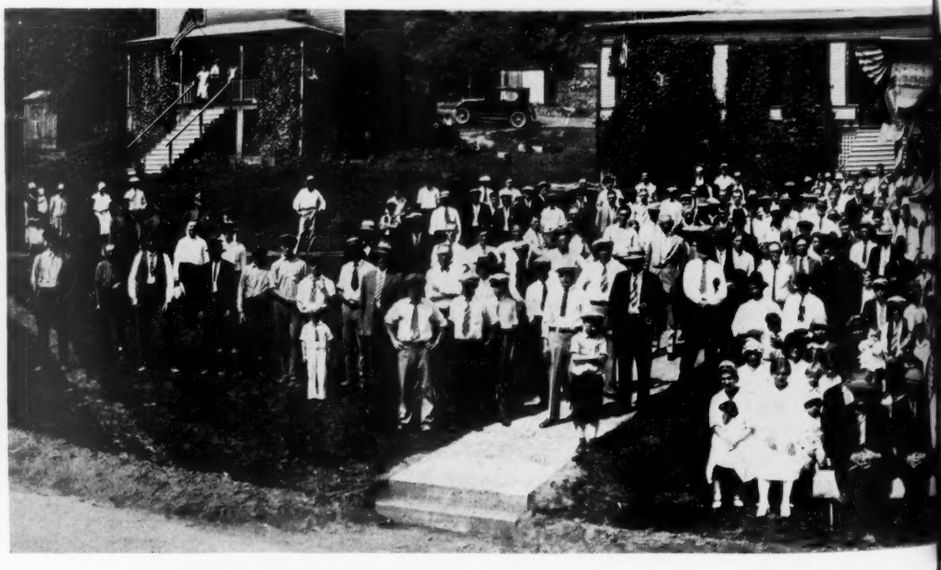
W. L. Matthes

and unveiling of its Portland Cement Association trophy. Dignitaries of the states, headed by Governor W. G. Conley of West Virginia, industrial leaders, educators, jurists, clergy, military, and citizens of surrounding cities and adjoining states joined with the workmen of the plant and officials of the company in an extraordinary occasion in the interests of plant and community safety and in testimony to the spirit of good will which the perfect safety record of almost two years reflects.

The program was as follows:

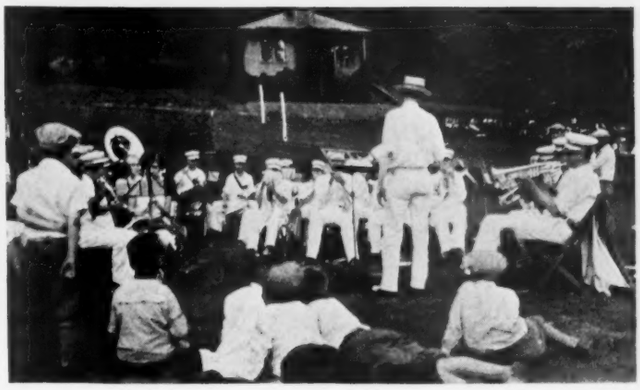
Opening Selection, "Under the Double Eagle"—Terra Alta High School Band.
Assembly called to order and Introductory Address—W. L. Matthes, superintendent of the Manheim plant.
Selection, "Southern Melodies"—Terra Alta High School Band.
Address of Welcome—G. S. Brown, president, Alpha Portland Cement Co.
Selection, "El Capitan"—Terra Alta High School Band.
Address, formally presenting the trophy—T. F. Boltz, representative, Portland Cement Association.
Unveiling of Safety Trophy—Miss Cathryn Fretwell and Master W. Leo Matthes, Jr.
Selection, "Stars and Stripes Forever"—Terra Alta High School Band.
Acceptance of Trophy—H. E. Lenker, plant engineer, Manheim plant.
Selection, "Invictus"—Terra Alta High School Band.
Selection, "Hail to the Chief"—Terra Alta High School Band.
Address of Dedication—Hon. William G. Conley, governor of West Virginia.
Band concert; athletic contests; refreshments; presentation of prizes; dinner.

In preparation for the dedication, the plant had been closed down and all was in readiness. Despite the extremely warm day, a crowd of more than 2000 persons packed the lawn and surrounding terrain well in advance of the hour, which was set at two o'clock. Interest and enthusiasm ran at a high pitch throughout the meeting, which lasted until near five o'clock. Notwithstanding the intense heat and brilliant sunshine, which burned faces and necks and wilted



Part of the crowd of over 2000 friends, visitors and employes which gathered

Governor W. G. Conley of West Virginia making the dedication address



Terra Alta high school band playing for the crowd

collars, the assemblage remained most attentive and greeted each feature of the program with bursts of applause, culminating into an enthusiastic demonstration at the unveiling of the trophy and again when the chief executive of the state arose preparatory to delivering the dedicatorial address. It was the day for which the employes of the Manheim plant had been working for many years and one which they had anticipated for many months, and they and their families and their friends were there to enjoy it to the utmost.

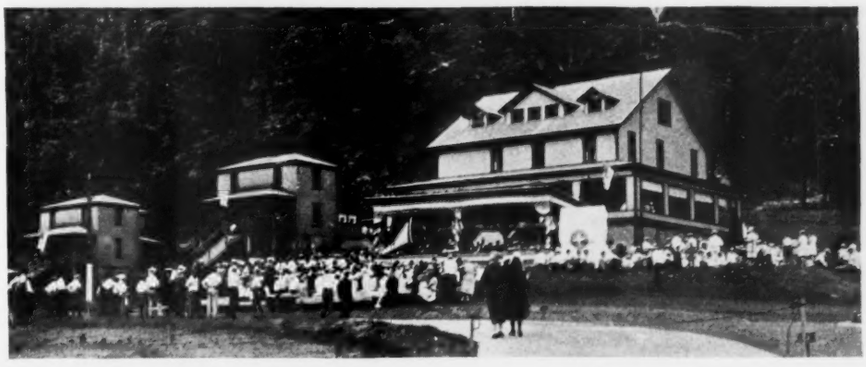
At the conclusion of the ceremonies, a sumptuous dinner, served in true southern style, magically appeared on tables set on the lawn, and in which employes, officials and the invited guests to the number of 250 joined together for refreshment after work well done.

Following the dinner, toasts, coupled with brief remarks, were responded to by Hon. Frank L. Bowman, representative from the second congressional district of West Virginia; Hon. Howard S. Jarrett, state commissioner of labor; Judge A. G. Hughes, presiding judge of Preston county circuit court; Dr. M. H. Proudfoot, plant physician; Hon. P. J. Crogan, dean of the county bar; Adjutant General C. C. Pierce, commandant, national guard of West Virginia; and Hon. James Henry Smith, member of the state legislature.

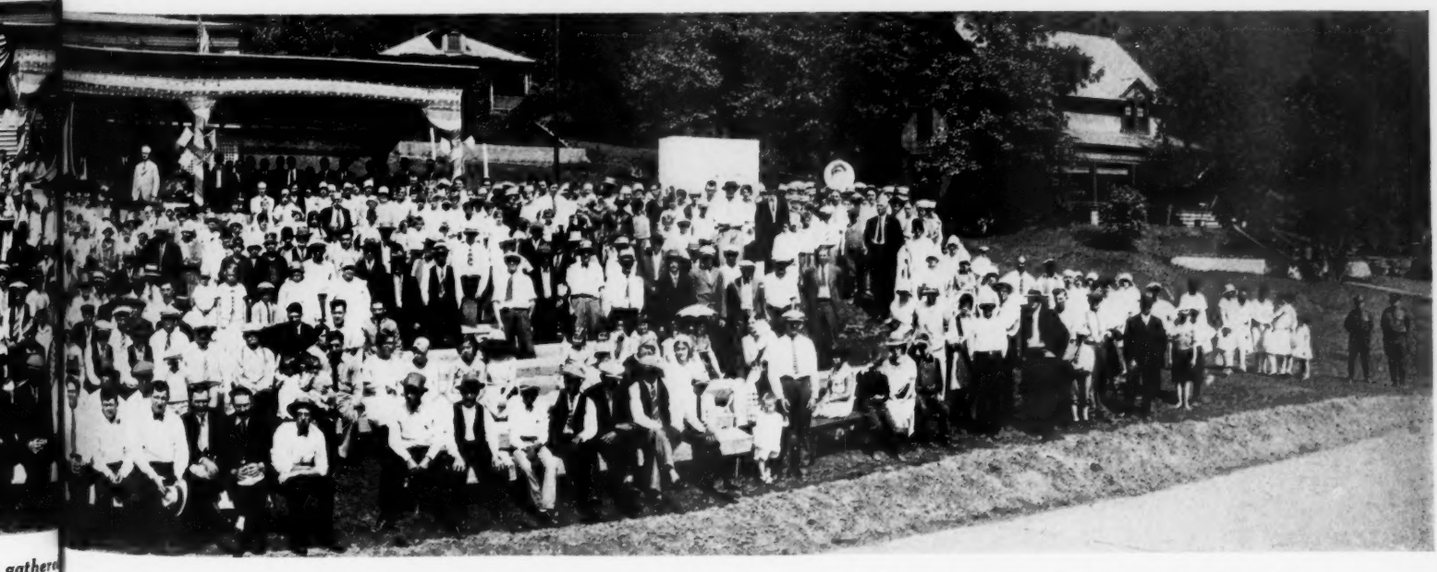
Previous to the dinner, a series of athletic contests were held, participated in by the employes and their wives, sons and daughters. Suitable prizes were awarded the winners. The interest was deep and the competition keen in all events.

In the evening, community dancing was held with a Mardi Gras carnival with all employes, officials and guests taking part in this enjoyable feature of the day's activities. Music for the dancing was furnished by a well-known local orchestra.

Altogether it was an occasion long to be remembered by those present, and on every

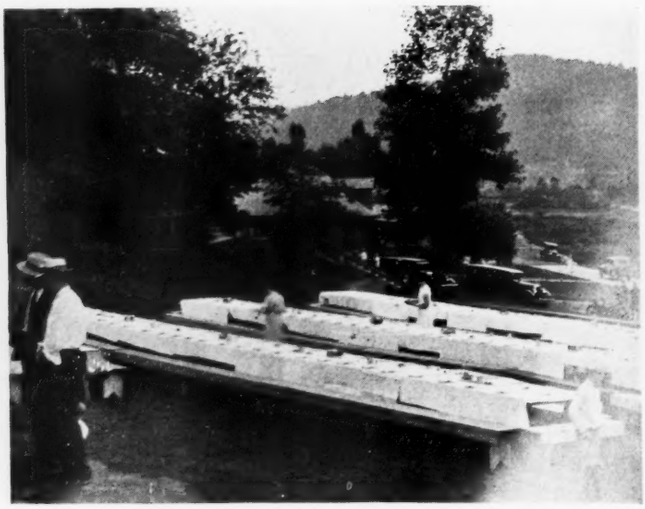


Part of the assemblage at the dedication ceremonies



witness the formal dedication of the 1928 safety trophy at the Manheim, W. Va., plant, Alpha Portland Cement Co.

Safety trophy after unveiling at Manheim



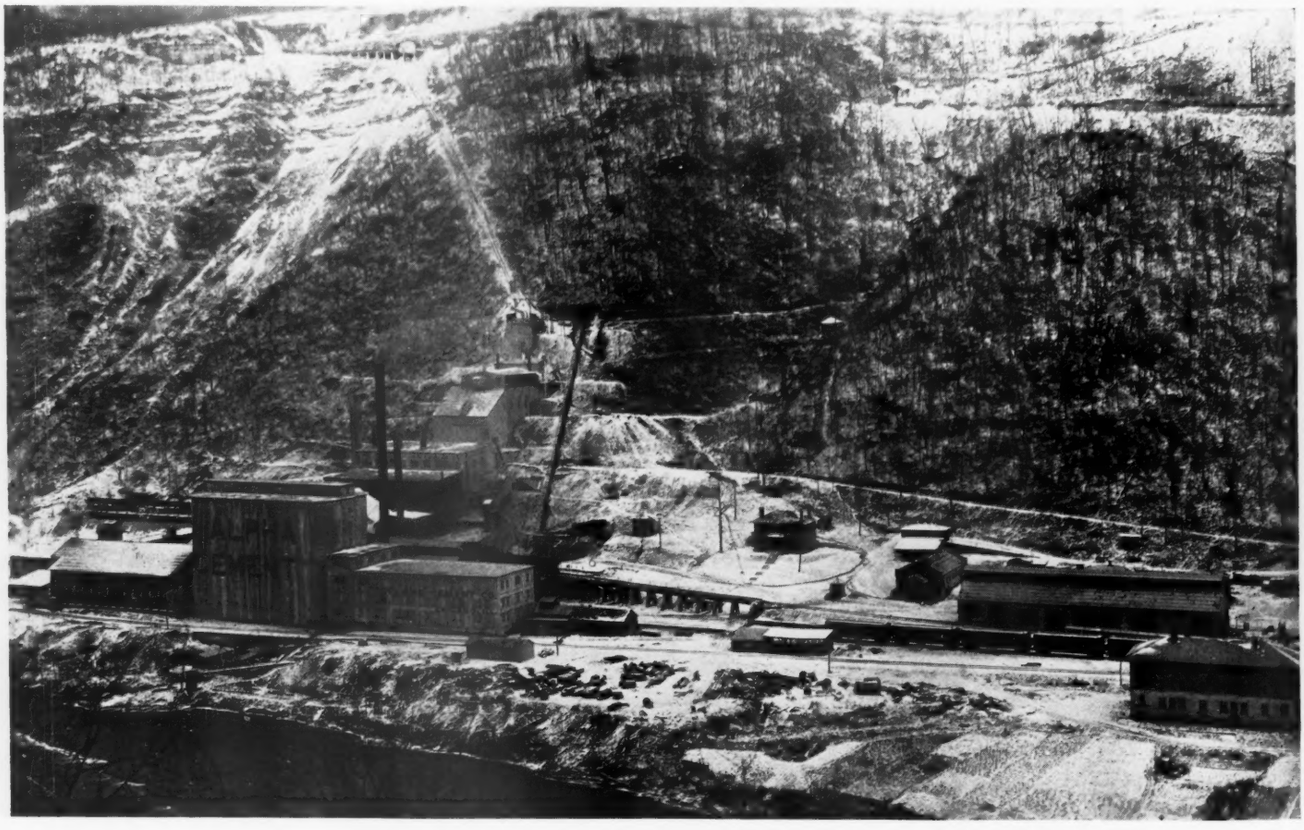
Luncheon tables in readiness for the visitors

hand compliments were heard praising the affair and the efforts put forth for its success, the cordiality of employes and officials, and finally the heartfelt interest displayed in the trophy itself and the significance attached to its award.

Superintendent Matthes acted as master of ceremonies and in his introductory address reviewed the campaign waged for safety at the Manheim plant over a period of years, stating that the last lost-time accident at the plant occurred on August 20, 1927. In the course of his remarks Superintendent Matthes praised highly the encouragement and support given the safety movement by the management of the Alpha company; and also expressed his gratification in the loyal co-operation of each employe to make possible this enviable safety record.

President Brown, beaming with unconcealed pride in the achievement of the Manheim plant, addressing the throng as "My Fellow Workmen," said: "There is always one thing that I reserve for myself, one act that I do not delegate to another; one which to do I am never to busy, and one in which I take considerable pride. It is that of attending and taking part in the dedication of the safety trophy at those of our plants who are fortunate enough to receive them, and I assure you that it gives me pleasure to be with you on this auspicious occasion and share with each of you the joy it brings."

T. F. Boltz, representing the Portland Cement Association, formally presented the trophy, following which the trophy was unveiled, amidst the plaudits of the crowd, by Miss Cathryn Fretwell and Master Billy Matthes, Jr.



The Manheim, W. Va., plant of the Alpha Portland Cement Co.

In accepting the trophy, H. E. Lenker, plant engineer, gave a brief resumé of how accidents had diminished at the Manheim plant making a plea that the good work be continued so that suitable inscriptions could be engraved on the trophy for perfect records in succeeding years.

As the principal speaker of the day, Superintendent Matthes introduced Hon. William G. Conley, governor of West Virginia, who delivered a very eloquent and inspiring address, using as his theme, in keeping with the occasion, "It Is Better to Dedicate a Trophy to the Living as a Mark of Careful Habits and Safe Practices Than a Monument to the Dead as a Result of Carelessness and Neglect."

Governor Conley, a former resident of the county, expressed his pleasure in being able to return to the place of his nativity on such a memorable occasion and take part in the exercises of the day. The governor was born in Preston county, not many miles from Manheim, and in early life taught in the public schools. In congratulating the organization upon their perfect safety record, the governor expressed the hope that other industrial establishments throughout the domain of the state would seek to emulate the record of the Manheim plant.

Among others of prominence present were Hon. Lee Ott, state compensation commissioner; Senator A. L. Helmick; H. R. Laughlin, superintendent, Baltimore & Ohio Railroad Co.; J. G. Prichard, secretary, West Virginia Manufacturers Association; A. W. Louther, district superintendent, Bethlehem Mines Corp., West Virginia division; all of the district managers and sales force of the Alpha company; and, in addition to President Brown, the following officials from the Easton, Penn., headquarters: Vice-President F. G. McKelvy, General Superintendent N. D. Colburn, and Safety Director W. W. Hamilton.

T. F. Boltz

Illinois Ranks Second in Use of Sand and Gravel

ILLINOIS now ranks second in the United States in consumption of sand and gravel for construction and development work, with New York first, Michigan third and California fourth, official Department of Commerce figures reveal. Investment in the aggregates industry in the United States is estimated at $400,000,000. The business has grown 432% since 1908, and in 1927 did a national business amounting to $115,529,000. —*Chicago Journal of Commerce.*

Wayne County Increases Use of Agricultural Lime

ACTIVITIES in the lime business indicate that Wayne county, Ohio, will use increased tonnage during the coming fall, probably surpassing any previous year, which has amounted to approximately 20,000 tons.

Agents for the lime companies are particularly active canvassing and soliciting orders with dealers among the farmers. Wooster almost seems to be the center of activities of this section, as representatives for three companies live in Wooster and a number of others reside in Wayne county.

C. M. Baker is district representative for the Ohio Hydrate Supply Co., Woodville. Claude Jones represents the France Stone Co. of Toledo. The Michigan Limestone Co., Buffalo, N. Y., has A. J. Anderson with headquarters at Wooster. Harry Swigart, to whom goes the credit for being probably the first active lime salesman in Wayne county, represents the Peerless Limestone Products Co. of Hillsdale, Mich. C. R. Myers of Bowdil represents the Marble Cliff Quarries Co. of Columbus. Benjamin Wengert of Orrville is district salesman for the Dolomite, Inc., of Cleveland.

The price of hydrated lime has been reduced approximately $1 over the price of last year and now is selling for $9.50 a ton out of the dealer's warehouse. No reduction in prices has been given on various grades of pulverized stone and screenings.

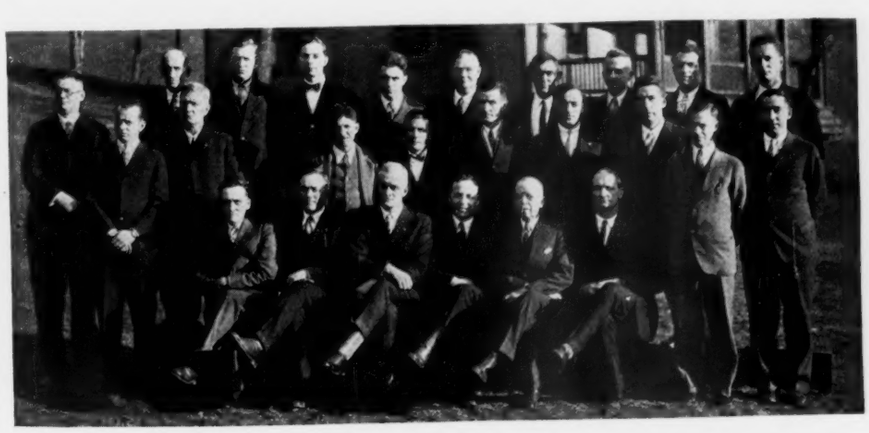
Since the prospects on the wheat yield are good it is believed that farmers will give more attention to liming this year than ever. —*Wooster* (Ohio) *Record.*

Panhandle Asbestos Goes Under the Hammer

W. J. RAMEY and F. F. Pomeroy bid in the plant and building of the Panhandle Asbestos Co., Kamiah, Idaho, at the sheriff's sale of the property. The sale was ordered by the district court to satisfy a judgment of about $1600 against it by Messrs. Ramey and Pomeroy. The former was for a while manager of the Panhandle company when it was first organized. None of the stockholders of the Panhandle Asbestas Co. appeared in any of the legal proceedings to protect the property.

The Panhandle company was organized several years ago and it is said that as much as $200,000 worth of stock was disposed of by the promoters. Much of that sum went to the promoters, it is said, but many thousands were spent in equipping the Kamiah plant and in developing the mines, which are situated in the Glenwood country some 15 miles from town. The plant is equipped with a large amount of machinery for reducing the asbestos rock and represents an investment of from $25,000 to $30,000 as it stands at present. There are crushers and roller mills and other machinery, all of which is still in pretty fair shape. A 100 hp. electric motor furnishes the power.

The asbestos from the Glenwood mines is said to be the short-fibered variety, of good quality.—*Kamaih* (Idaho) *Progress.*



The 1928 safety committee, Manheim, W. Va., plant, Alpha Portland Cement Co. First row, seated, left to right: C. H. Bolyard, W. B. Shaver, L. M. Smith, W. L. Matthes, Dr. M. H Proudfoot, D. A. McVicker. First row, standing, left to right: R. H. Fretwell, H. H. Davis, A. H. Fretwell, J. P. Layton, Bailey McVicker, Charles Grimm, E. H. Bolyard, C. B. Bishoff. N. D. Hooton, Phillip Brutto. Second row, left to right: Gilbert Goff, F. S. Fretwell, O. R. Dewitt, F. W. Gibson, Noah Witt, W. S. Heath, H. E. Lenker, J. T. Sinnott, R. M. Hertzog

New York Crushed Stone Association Makes Merry at Churchville

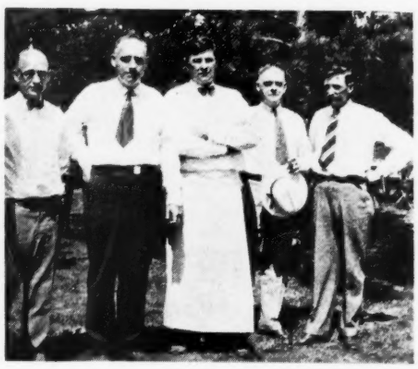
MUCH could be said and more written about the midsummer meeting of the New York State Crushed Stone Association which was held at Hill Crest Farm, Churchville, N. Y., on Friday, July 19. The attendance was just as fine as the wonderful summer's day of the outdoor party. All but three or four firms in the whole organization were present and these sent their regrets. Again the choice of the beautiful estate of D. N. Boice of the Genesee Stone Products Co. as the spot for the gathering simply could hardly be excelled. Then the reception accorded the members and the delicious viands served on the spacious lawn amid the evergreens created an atmosphere of congeniality that even "stone" men could not resist. In all, a meeting which will go down in the records as one of the best ever held by the association.

At 11 a. m., Mr. Boice, whom we shall hereafter call DeLancey because of his congeniality and cheerful disposition, greeted the first arrivals; and they continued coming until 38 had put in an appearance. Genial Bert Owens of Utica, secretary of the association, immediately got busy with his sport paraphernalia and soon had a ball game and a horseshoe pitching match under way. The elderly members (and there are still a few in the crushed stone game) contented themselves with sitting around on the lawn and spinning yarns about just how many thousands of tons per hour they could produce. Accurate notes of what was going on all at once could not be kept, but we did visit the ball game to find if possible a few embryo "Babe" Ruths or "Lefty" Groves. It was billed as a contest between the superintendents and the salesmen, but only one inning was played and at that time the score was 47 to 29 in favor of whoever you chose.

Ever and anon the cry of "ringer" gave indication that the horseshoe pitching matches were being vigorously contested, but we did not hear much noise from the golfing fraternity who were supposed to "drive' and "putt" for prizes. Possibly this was due to modesty or a disinclination to reveal individual scores.

Shortly after 1 o'clock DeLancey announced that dinner was ready and it needed no second bidding to participate in the repast arranged on tables on the beautiful rear lawn. To those who were unfortunate enough to be absent it would be unfair to dwell too long upon this phase of the day's activities, but it is not amiss to state that the fried chicken, fish and other viands were simply delicious. DeLancey Boice and Arthur Caldwell and all the rest of the "Genesee" boys proved themselves wonderful hosts and the fact that second and sometimes third helpings were requested—and served promptly—is ample evidence that it was appreciated.

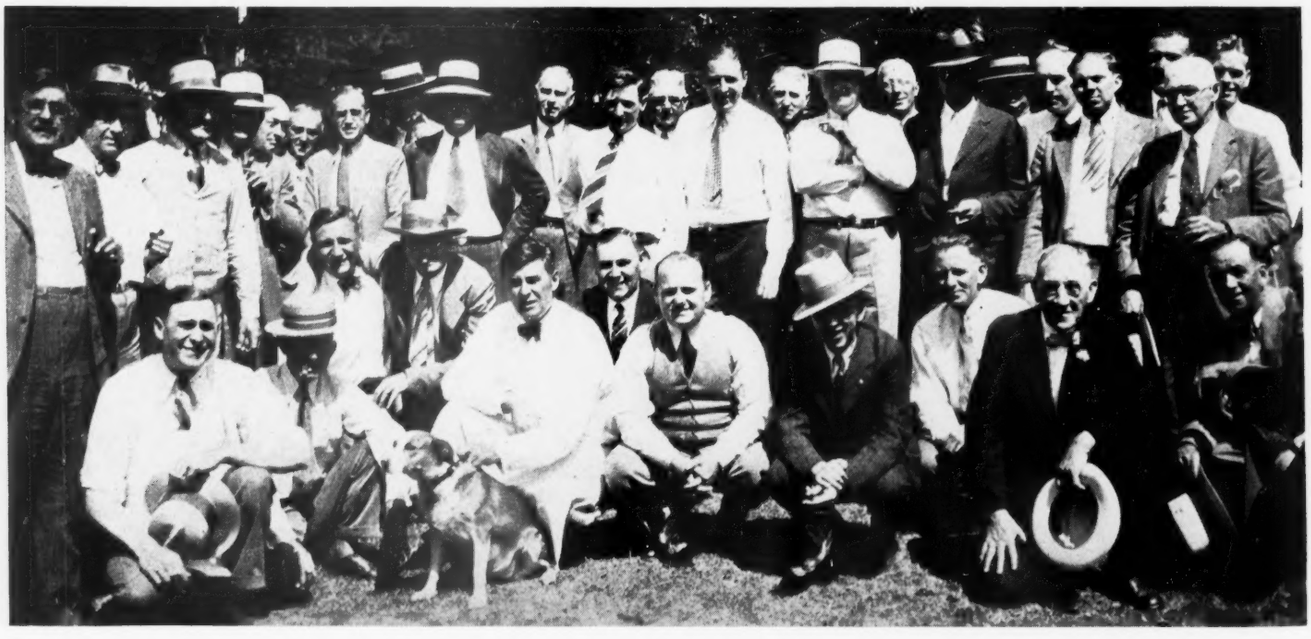
After the dinner a prize was offered for anyone who would ride one of the three prize bulls exhibited for the entertainment of the association. Superintendent Bigg of Stafford won that questionable honor and the inimitable "Jim" Savage with his ever active movie camera can vouch for the feat.



The hosts to the association, left to right—Clarence Buckholtz, A. B. Caldwell, D. N. Boice, Neil Caldwell and F. T. Bibb, all of the Genesee company

Business Meeting

At 2 o'clock President Savage with the assistance of Secretary Owens and about seven or eight deputies finally succeeded in rounding up the scattered members and called a business meeting to order. The minutes of the June meeting at Trout Brook Inn were read and approved, after which N. S. Snyder of the Link-Belt Co., Buffalo,



A bunch of the New York state crushed stone producers at the Boice estate in Churchville—the scene of the 1929 midsummer's meeting of the New York State Crushed Stone Association

N. Y., was voted an associate member of the organization.

Secretary Owens spoke of the unsatisfactory condition of some of the dirt shoulders on improved concrete highways and suggested that the attention of the highway department be called to the fact that a more stable material such as screenings would materially improve such a condition. He mentioned one particular highway in the neighborhood of Utica where the state had utilized some of his screenings for shoulder support with highly satisfactory results. After some discussion on this subject it was decided that the secretary develop the matter with Albany to see what could be accomplished.

George Schaefer then reported on his attendance at the Albany meeting of the State Contractors Association and stated his belief that the stone association would be recognized by having one or more of its members represented on committees of the contractors organization.

Discussion then centered upon various types of construction and it was the general belief that crushed stone was suitable for any type designated, and should properly be included in all specifications. It was decided that President Savage appoint a committee to review the general conditions of the industry in the territory and to study ways and means of promoting a more extensive use of crushed stone in construction work. Mr. Savage named a committee of Messrs. Heimlich as chairman, Callanan and Sporborg.

Mr. Callanan then extended an invitation to the association to hold its next meeting in the Albany district, and it was so decided by vote. Mr. Sporborg in a few well chosen words then offered the thanks of the association to Mr. Boice and the Genesee Stone Products Co. for their gracious hospitality and efforts in insuring such a pleasant meeting.

As indications were then prevalent that entertainment and sports were more desirable than serious discussion, the business meeting adjourned, and the balance of the afternoon spent as only good and true stone men would prefer.

Let us not neglect to state in passing that the inspection of the prize blooded stock of Mr. Boice was well worth the trip around the estate and that no effort was spared by him or his assistants in fully explaining details that created the unusual interest.

As the lengthening shadows presaged the end of a perfect day, the members rather reluctantly took their departure shortly after 6 o'clock.

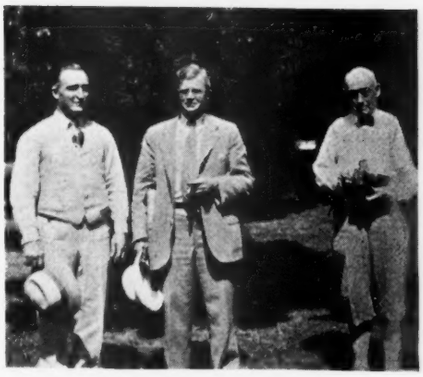
Those in attendance were as follows:

REGISTRATION

Buffalo Crushed Stone Co., Buffalo, N. Y.
A. L. Hooker, James Savage.
Callanan Road Improvement Co., Albany, N. Y.
Reed Callanan.
Dolomite Products Co., Rochester, N. Y.
Harvey Clark, Leonard Harris, Richard Howland, Charles Odenbach, John H. Odenbach, Matthew Odenbach, Arthur Sickles.
General Crushed Stone Co.
Oliver Dietschler, James W. MacCone, Grover J. Murphy, Francis C. Owens, George E. Schaefer, A. L. Scott, W. L. Sporborg.
Genesee Stone Products Co., Batavia, N. Y.
F. T. Bibb, DeLancey N. Boice, Clarence Buckholtz, Arthur B. Caldwell, Neil Caldwell, L. E. Whitlock.
Gouverneur Limestone Co., Gouverneur, N. Y.
H. H. Hodgkin.
Jointa Lime and Stone Co., Glens Falls, N. Y.
H. J. Russell.
LeRoy Lime and Crushed Stone Co., LeRoy, N. Y.
J. L. Heimlich, D. L. Moore, Duane Moore.
L. and M. Stone Co., Prospect, N. Y.
William McGrew.
Morristown Stone Co., Morristown, N. J.
F. W. Schmidt.
Peerless Quarries, Inc., Utica, N. Y.
A. S. Owens.
Wickwire Spencer Steel Corp., Gasport, N. Y.
Fred Foote.

GUESTS

William Anderson, Hercules Powder Co., Buffalo, N. Y.; Darroll L. Cheney, Marion Steam Shovel Co., Buffalo, N. Y.; C. M. Howser, Marion Steam Shovel Co., Marion, Ohio; J. A. Land and F. T. Ransom, E. I. du Pont de Nemours and Co., Buffalo, N. Y.



Officers of the association, left to right—J. L. Heimlich, vice-president; A. S. Owens, secretary-treasurer, and James Savage (with his ever present movie camera)

British Quarrying Institute Holds Annual Conference

THE ELEVENTH annual conference of the Institute of Quarrying (Great Britain) was held at Brighton, England, June 24 to 28 inclusive. The program was replete with interesting papers on British quarrying practice. Various activities of the institute committees were reported and discussed. Stanley Millington, assistant manager of the Llysafen Limestone Quarries, North Wales, was awarded the Maybury medal and fellowship for his paper, "The Well Drill Method of Boring and Blasting Limestone and Other Rocks."

Iowa Awards Cement Contracts

DIRECT purchase of cement from the mills was adopted recently by the Iowa state highway commission for the first time in its history. Contracts for 40,000 bbl. each were awarded to the Pennsylvania-Dixie Cement Corp. and the Hawkeye Portland Cement Co. of Des Moines for use in 19 miles of paving in Boone and Audubon counties.

Monolith Company Tenders Banquet to Employes

THE IMPORTANCE of cooperation of customer-owners in the growth of the Monolith Portland Midwest Co. was the keynote presented at a recent banquet of employes and stockholders of the company held at the Women's City Club, Oakland.

S. C. Patrick of Los Angeles, supervisor of offices of the company, was the principal speaker. He pointed to the growth of the company from 1922, when its one plant produced 400,000 bbl. of cement annually, to 1928, when two plants turn out more than 1,600,000 bbl. each year.

Other speakers were: W. J. Harrison, manager of the company's San Jose office; J. A. Seyforth, Oakland office manager; W. M. Tennant, Fichard Nash and H. W. Wilson of San Jose; Oakley Bradley of Oakland; J. T. Stanton of San Francisco, and Dr. Charles Holbrecht, San Francisco stockholder. W. T. Strout, president of the Monolith Booster Club, was toastmaster at the banquet.—*Oakland* (Calif.) *Tribune.*

Municipal Airport Conference

A MUNICIPAL airport conference will be held in Washington, D. C., on October 24 and 25 under the auspices of the city officials' division of the American Road Builders' Association.

Among the subjects to be presented for consideration at this conference, which is of interest to rock products operators, is the design of runways, landing areas and field surfacing.

The committee is now collecting data on the most recent practices in connection with municipal airports.

Seattle May Soon Export Phosphates

PREDICTION that Seattle may develop as a major export point for phosphate rock, principally to Japan, is expected to develop following the announcement that the Montana Phosphate Co., recently organized by H. P. Lake of Portland and Maj. H. W. Boetzkes of Seattle, was planning to concentrate its foreign business at this point.

When operations in the offshore trade reach sufficient proportions, Major Boetzkes stated, application will be made to the Port Commission or other interests for adequate facilities required in handling the rock.

The Montana Phosphate Co. has a mine near Garrison, Mont., Major Boetzkes declared, with several hundred thousand tons of phosphate now in sight. Tests of the rock, he said, show it to be of good grade.

Japan at this time, he added, imports about 600,000 tons of phosphate rock annually, the greater part of its supply coming from Florida, Algeria and the South Sea Islands.—*Seattle* (Wash.) *Times.*

Medusa Portland Plans Big Extension Program

MEDUSA Portland Cement Co., formerly the Sandusky Cement Co., is planning to absorb Michigan and Wisconsin properties and to erect a huge plant at Charlevoix, Mich.

This will be the company's ninth mill. There are two at York, Penn. (one making white cement), and plants at Wampum, Penn., Dixon, Ill., Sylvania, Ohio, and at Bay Bridge, and, with acquired properties, plants at Newaygo, Mich. and Manitowoc, Wis. It would give the Medusa company a capacity of 8,000,000 bbl. of cement annually.

The deal provides for consolidating the Newaygo Portland Cement Co. of Newaygo, Mich., and the Manitowoc Portland Cement Co., Manitowoc, Wis., which is controlled by the Newaygo company, into the Medusa Cement Co. through an exchange of stock.

This will give the Medusa company its first lake port and also an 800-acre tract of land in the Charlevoix (Mich.) district which contains a deposit of limestone estimated at 90,000,000 tons.

This property is controlled by the Charlevoix Rock Products Co., subsidiary of the Newaygo company, which also owns the Cement Transit Co., operator of a self-unloading cement carrier. Silos for storage and packing of cement for truck delivery are also operated by this company.

Stockholders are being advised of a special meeting July 30 to consider the proposed plan of reorganization, merger and consolidation. Terms provide for an exchange of common stock on a basis of 1¾ shares of Medusa for each share of Newaygo and the creation of 25,000 shares of $100 par cumulative preferred.

As Newaygo has outstanding 17,500 shares of $100 par common stock, this will require 30,625 shares of Medusa and bring up the outstanding common to 177,553 shares. It is proposed to issue 5000 shares series A cumulative 6% preferred stock redeemable at $102 and accrued dividend, which will be used to acquire the Newaygo preferred and for other corporate purposes.

In a letter to the directors, the committee consisting of E. B. Greene, E. S. Hanson, J. B. John, A. C. Dustin and E. J. Maguire lists among the advantages to be gained by this consolidation the increased capacity, consequent reduction in operating cost, and the fact that one of the Newaygo plants is located on the Great Lakes with silos for packing and delivery of cement to Chicago and Milwaukee, and is able by reason of water transportation to extend such facilities to other lake cities.

The deal will not become effective unless a majority of the common and preferred shares of the Newaygo company are deposited with the Cleveland Trust Co. before September 1.

"We plan to erect a mill at Charlevoix, Mich., and ultimately build another boat for hauling cement," E. J. Maguire, secretary of the Medusa company, said. "This will add about 1,500,000 bbl. of cement a year to our capacity, and with 2,000,000 added by the merger of Newaygo and Manitowoc bring our total close to 10,000,000 bbl. a year."

Clay H. Hollister, Grand Rapids banker, is president of the Newaygo company and Charles C. West is president of the Manitowoc company. J. B. John, president of the Medusa, is vice-president and general manager of both the Newaygo and Manitowoc companies.—*Cleveland* (Ohio) *Plain Dealer.*

Canada Gypsum Purchases Wellington Lime Interests

THE ACQUISITION of the Wellington Lime Co. and its lime interests in Ontario by the Canada Gypsum and Alabastine Co., Paris, Ont., is announced by Mace Main, manager of sales promotion for the Canada company. With this addition the Canada company will now control eight major and several other minor lime developments in the province of Ontario.

The company now operates in addition to the Elora dolomitic limestone deposit and plant the following:

Beachville; quarry and plant of the former Beachville Lime and Stone Co., producing a high calcium lime for industrial uses, pulp and paper manufacture, water softening, glass, sugar, oil refining, tanning, bleaching powder and others.

Hespeler; this plant has been supplying a high grade of white hydrate, grey hydrate, lump lime and industrial hydrate to Ontario markets for some years.

Milton; limestone and grey lump lime are the main products, the former being supplied on some large contracts for road work, break-waters and other projects.

Limehouse; a grey limestone deposit, lump lime and limestone.

Kelso; grey lump lime plant which, due to the proximity of other similar plants, will probably be temporarily closed.

Dolly Varden; grey lump lime plant.

Puslinch; supplying a white lump lime suitable to the requirements of paper companies.

All plants, with the exception of Beachville, will be under the supervision of J. H. Robinson, present superintendent of the Elora plant. The Beachville development will be supervised by T. F. Robinson, former superintendent of the Canada company's plaster and wallboard plant at Montreal East. He will be assisted by Lorne Lymburner, formerly with the Caledonia staff.

The distribution of the high calcium lime from Beachville for chemical purposes will be under the direction of Donald C. Nickle, formerly chemist for the Spruce Falls Power and Paper Co., at Kapuskasing and for the Donnacona Paper Co. at Donnacona, Que.

Oklahoma Crushing Plant Nearing Completion

THE LARGE stone crushing plant of the Rogers County Crushed Rock and Lime Co., Inc., of Claremore, Okla., located 2½ miles south of Oolagah, east of the Missouri Pacific tracks, is nearing completion.

The plant will be one of the best equipped in this part of the state and when started will have an output of 40 cars of crushed rock a day. The company has booked orders for several hundred cars of the crushed rock.

The plant will be operated by electricity supplied by the Public Service Co. of Oklahoma and the installation of the electrical equipment will be done under the direction of Grover Dick, the Nowata manager. The plant will use 215 hp. to start and this will be increased to 400 hp. later when the plant is enlarged.

The plant will employ about 25 laborers. The date for the start of operations with the new plant has not yet been announced.

The total cost of the plant is in the neighborhood of $75,000, of which approximately $6000 is for the electrical power equipment. —*Nowata* (Okla.) *Star.*

Paramount Portland to Build Mill at Torrance

THE LAST remaining obstacle in the way of the erection of the $4,000,000 plant of the Paramount Portland Cement Co. at Torrance, Calif., formerly known as the Helbush Portland Cement Co., was removed recently in the acquisition of an additional six acres from the Sidebotham interests, adjoining the Paramount tract, for use in disposing of the 120,000 cu. yd. of soil to be removed in the construction of the plant. The acreage had to be withdrawn from the Lomita incorporation plans, of which it was a part, and annexed to the city of Torrance under special provisions before it could be utilized by the Paramount corporation. The plant will be an almost exact replica of Henry Ford's Rouge River plant, and has been designed by the same firm of engineers.

The company's tract, which comprises 100 acres, is in the southeasterly part of Torrance, on the Wilmington-Redondo road. Fifty acres were originally a part of the Palos Verdes tract.

Development is expected to be rapid following the measures just completed.—*Los Angeles* (Calif.) *Times.*

Dignifying Quarry Labor!

IOWA CITY, Ia., July 22.—[Special to the *Chicago Tribune.*]—Oran H. Pape, star University of Iowa half back, is spending the summer as a laborer in a stone quarry and expects to be in splendid physical shape when he reports for practice September 15.

Cement Products

Products Industry of Texas in Pioneer Stage

Only 12 Plants in the Entire State—Fort Worth Concrete Products Co. the Only Producer in Fort Worth

THE state of Texas has seven cities with a population of 60,000 or more. Agricultural expansion in the state is probably unparalleled anywhere in the United States; evidences of growth are not only to be seen in the larger cities but throughout the smaller towns and farming communities. The total population of the state is given as 5,487,000.

Texas has more land under cultivation than any other state in the Union; its crops last year were valued at $800,000,000. It has over 465,000 farms within its borders, a number greater by 180,000 than any other state. These farms for the most part grow cotton and last year produced 5,150,000 bales out of a total for the United States of 14,373,000 bales.

Yet with all this agricultural and industrial development that is now taking place in that state there are only 12 cement products plants listed with the state association. Considering that there are now eight portland cement plants in actual operation with a total annual production of over 7,000,000 bbl. per year and a ninth plant about to start operation and two more in the promotional stages, the ratio of cement produced to the number of cement products plants is unusual. There are far too few cement products plants in operation and these for the most part are comparatively small capacity affairs.

The producers have a state association of which John S. Chase of Fort Worth, Texas, is secretary and treasurer and they are bearing the brunt of the pioneer educational work necessary to get the contractors and builders acquainted with the advantages of precast concrete tile construction. This work has only been started and there is no question but what in time the cement products industry will rank high among the industries of that state. Concrete tile construction for homes and apartments throughout the southwest has not until very recently come into general use because the winters are so mild that it was not deemed necessary to build on the substantial basis which prevails in the more northern climates.

Storage yard and plant, Fort Worth Concrete Products Co.

Interior of the plant, showing the automatic stripper in operation

The only company at present producing concrete tile in Forth Worth, a city of 190,000 people, is the Fort Worth Concrete Tile Co., Inc., with plant and office at 917 North Main street. This company, like practically every other industry in that section, is only recently established; it was started about 15 months ago. Production is confined to the manufacture of full and fractional sizes of thin-walled, light weight tile of the type shown in the illustration. Later, when conditions warrant, other type of tile will no doubt be manufactured at this operation.

The aggregate used for the manufacture of tile consists of pea gravel and sand which is delivered to the Ideal mixer from ground storage pile by wheelbarrows. Sacked cement is used. The Ideal mixer holds sufficient

mortar for about 38 tile and discharges to an open bucket elevator serving the Ideal block machine. The mixer, elevator and block machine are all driven by a 25 hp. induction motor through a short counter shaft. Production is about 3000 tile per 10 hr. day.

The tile are allowed to stand in racks until sufficiently strong to withstand the handling necessary to get them to the outdoor storage. In the yard the tile are sprayed from time to time and kept damp for 14 days, after which they are allowed to completely cure for a total of 28 days before shipment.

The plant is quite close to the business section of town and is located on one of the main arterial highways leading into Fort Worth. The company has adopted a rather unique method of attracting attention to its plant and product by a neatly painted sign on the street side face of the tile storage pile.

The company at present employs five men in the plant with all deliveries being made by local trucking firms. John S. Chase is president of the company and R. Chase, secretary and treasurer.

St. Louis Products Plants Merge

GENERAL Material Co., St. Louis, Mo., has been formed as a result of the recent combination of the Wet-Mix Concrete Co. and the Commercial Concrete and Material Co. The company will operate plants on Flyer Ave., Park Ave. and Natural Bridge road. A. C. Butterworth is president.

Metal Coated Cement Products Shown in Germany

CEMENT products that had been sprayed with metal were recently shown in Germany. The process was developed by a scientist who claims that it renders the material waterproof. Molten tin, zinc or lead was sprayed over cement and concrete slabs, tanks and pipe, and is said to have been successful also in covering all other forms of artificial stone.—*Erie* (Penn.) *Dispatch-Herald.*

Concrete-Asbestos Pipe

A NEW CONCERTE asbestos water pipe has been developed and is being manufactured by Eternit Pietra Artificiale at their factory near Genoa, Italy, and it gives every indication of being of great importance to the water works operators, for the reason that this pipe, which can be manufactured for any working pressure, is not only permanent, but its carrying capacity also is permanent.

"Italit" pipe, the new Italian product, is made of 85% portland cement and 15% No. 1 shingle asbestos, together with proper proportions of mixing water. The new cement-asbestos pipe is made on a cylinder paper machine in exactly the same manner as shingles are made. The proper proportions of cement and asbestos are mixed in the ordinary beaters used in making paper. From the beaters the pulpy mass goes to the agitators and thence to the feed box, from which it is fed into the machine. The average shingle machine has four cylinders, but the pipe machine has six in order to secure a denser and more homogeneous product.

Agitators are spaced along the bottom of the machine to prevent deposition of the materials. As the endless belt passes through the box it picks up a thin layer of this intimate mixture of asbestos and cement, and carries it to the accumulator cylinder at the end of the machine.

By reason of the greater affinity which this mixed material has for the iron, the layer leaves the belt and is deposited upon the accumulator cylinder. When the proper thickness has been reached the cylinder of asbestos and cement is cut, removed from the accumulator cylinder, trimmed to 4x8-ft. and cut to stock sizes. After air and water curing at room temperating temperatures for 30 days they are ready for shipment.—*Water Works Engineering.*

Effect of Heat on Concrete Strength

THAT CHANGES in temperature affect the strength of concrete has long been known, but quantative studies of the effect are rare. One, from the University of California, was briefly reported at the 1928 meeting of the American Society for Testing Materials. Another has recently been published as Bulletin No. 2825 of the University of Texas, and the laboratory work for it was mainly done by John E. Hoff, holder of the Texas Portland Cement Co.'s scholarship.

This series of tests is of unusual interest, as it includes determinations not only of the loss and gain of strength due to changes in the temperature but also the recovery that took place when the samples were stored for a sufficient time at normal temperature.

Tension and compression tests were made on 1:2 and 1:3 mortars and neat cement at 7 d. and 28 d. and at 32, 54, 70, 110 and 140 deg. F. Cross-bending tests were made on beams of 1:2 mortar, tested as cantilevers, at 34, 62, 140 and 212 deg F. In all cases the specimens were stored in a damp room of uniform temperature and heated or cooled in water of the desired temperature just before testing. Hence the variations of temperature found apply only to wet concrete.

Taking the strength at 70 deg. as normal, it was found that cooling the specimen increased its strength, while heating it decreased it. The strength in tension was affected more than the strength in compression and the strength in cross bending was affected most of all. The specimens having the most cement showed the most variation, the greatest variation being shown by neat cement. The recovery tests showed that wet concrete which has been heated sufficiently to lose some of its strength will recover much of it by storing it a short time at normal temperature, and that possibly it will recover all of its strength if stored at normal temperature for a sufficient time.

Experiments on dry specimens are reported to be in progress. The report calls attention to the necessity of storing specimens for testing for a sufficient time in water of the specified temperature if they have been overheated, as specimens so often are in the summertime. It seems quite probable that some of the unexplained variations in the results of different laboratories are due to variations in temperature during curing which were not followed by a sufficient time in water of 70 deg. to permit of recovery to normal strength.

The results of some of the tests as given in the report are:

VARIATIONS IN TENSILE STRENGTH

Temperature	deg. F.	34	52	70	110	140
Neat, 7-d.	lb.	894	822	679	593	399
Neat, 28-d.	lb.	972	787	728	573	438
1:2 mortar, 7-d.	lb.	466	440	430	345	276
1:2 mortar, 28-d.	lb.	572	558	512	429	329
1:3 mortar, 7-d.	lb.	330	328	306	286	220
1:3 mortar, 28-d.	lb.	425	446	424	343	260

VARIATIONS IN COMPRESSIVE STRENGTH

Temperature	deg. F.	34	52	70	110	140
Neat, 7-d.	lb.	8,390	8,170	7,550	6,610	6,400
Neat, 28-d.	lb.	12,060	11,700	11,650	9,650	8,640
1:2 mortar, 7-d.	lb.	2,660	2,660	2,790	2,560	2,500
1:2 mortar, 28-d.	lb.	4,840	4,520	4,610	4,150	4,060
1:3 mortar, 7-d.	lb.	2,160	2,120	2,015	1,938	1,863
1:3 mortar, 28-d.	lb.	3,050	3,160	2,960	2,700	2,600

VARIATIONS OF CROSS BENDING STRENGTH OF 1:2 MORTAR BEAMS
(After soaking 10 min. in water of the temperature stated)

Age, 14 days					
Temperature	deg. F.	34	62	140	212
Modulus of rupture	lb.	889	811	448	210
Age, 28 days					
Temperature	deg. F.	34	66	140	212
Modulus of rupture	lb.	980	919	594	241
Age, 100 days					
Temperature	deg. F.	34	76	140	212
Modulus of rupture	lb.	1,156	980	705	344

Effort Launched to Put Indiana Into Cement Business

ENTICED by the lure of cheaper cement the people of Indiana are being urged to put the state in the manufacture of cement despite the costly examples presented both by Michigan and South Dakota, two states which are paying heavily for their experiments with government operated business, says a report in the clip sheet of the Industrial Conservation Board, Inc. The taxpayers of Michigan, according to a recent report by Gov. Fred W. Green, have had to foot a $751,435.73 bill for a cement plant which began operations in 1923, continued losing from the day it opened until the time which Governor Green declared "no private concern would buy this plant with the idea of operating it."

Commenting on the efforts to put Indiana into the cement business, W. M. Kinney, general manager of the Portland Cement Association, cited Governor Green's report as the best evidence of what happens when government enters into competition with private industry.

"It would be prohibitive to operate this plant," said Governor Green, "if it were not for the advantages the state has over a private enterprise. These include lower costs of labor (prison labor), no sales expenses, no losses through poor credits and unpaid accounts, no taxes, no interest on borrowed money and no expense for fire and compensation insurance premiums. Neither is there any provision for a return on invested capital. It is estimated that 5% per annum on the amount of the state's funds that have been used in this industry would total over $100,000. This has not been taken into consideration in determining the state's costs.

"In considering the financial condition of the industry attention is called to the report of the auditor-general which shows the condition as of December 31, 1928. While the plant shows a paper profit of $59,945.71 during the last two-year period, I would call your attention to the fact that it has not been possible to use this amount in reducing the indebtedness. It has been put back into the business. As the auditor-general points out, no depreciation charge has been included in the costs, although a part of the repairs and replacements have been charged into expense. Had depreciation charges been taken into consideration, this paper profit would have been absorbed and the statement would show a red balance.

"If the plant were put on the market as a commercial enterprise it is doubtful if it would bring more than salvage value in the event of sale.

"It is not good policy for the state to be engaged in a private industry unless there is an unusual reason for it."

South Dakota's state cement plant at Rapid City, like the one in Michigan, operates so as to show paper profit, but the books do not include money paid out by the state as interest on the bonds issued to build the plant. That sum amounts to $102,700 annually on a $2,000,000 bond issue and a special tax of 0.11 mills is levied against the citizens of the state to take care of the bond charges which are not charged against plant operations.

Despite the huge investment in the plant, gross sales are slightly over $500,000 yearly.

Receivers Appointed for Southern Consolidated Granite Corp.

R. E. BABB of Laurens, S. C., was appointed co-receiver with A. E. Tinsley of the Southern Consolidated Granite Co. by agreement of counsel in court of common pleas at Spartanburg, S. C.

The Spartanburg Quarries Corp. was organized in 1924 and operated until May, 1928, when it was sold to the Southern Consolidated Granite Corp., a Delaware concern. This organization planned to merge 12 quarries in the South Atlantic states into a big corporation.

The Spartanburg quarry and the Wake Forest, N. C., quarry were the only ones to sell to the Consolidated corporation.

Two actions were instituted at about the same time, one by E. A. Mabrey, an employe, against the Southern Consolidated for wages and another by the Continental Trust Co. Mr. Tinsley was made receiver in the first action.

The protest that he was not suitable to the bondholders followed, the bondholders committee maintaining he was affiliated with the Spartanburg Quarries Corp., which had been absorbed by the Consolidated, as a stockholder.

A bondholders protective committee was organized in Washington, where the Southern Consolidated bonds were sold in large numbers, after the corporation failed to meet its interest or sinking fund payments issue due on April 1, 1929.

The bonds valued at $550,000 were secured by two quarries, issued $300,000 against the North Carolina concern and $250,000 against the South Carolina concern.

Charges have been made that the value of the bonds and the methods used by individual stock and bond salesmen have been criticized in Washington. The prospectus drawn up when the bonds were issued is said to have misrepresented the facts.

It was said that the bonds, in unlisted security circles, were dealt in extensively for several months in Washington, Maryland and Virginia at considerably less than their face value. Some security dealers, it was alleged, apparently were buying the paper at low cost and selling at face value. It was not known whether the quarries will be operated or sold. All further progress in the case awaits conference of the receivers. —*Laurens* (S. C.) *Advertiser.*

Stockton Cement Mill Project Assured

FOLLOWING satisfactory conclusion of negotiations for a plant site, the Port Stockton Cement Co. has announced that it will build a modern cement mill to cost about $3,000,000 at Stockton, Calif. The plant will have a yearly capacity of 1,000,000 bbl. and will be erected on a 29-acre site on the Stockton deep-water channel. Plans are also being completed for machinery equipment for a quarry near Columbia, Tuolumne county.

The plant site was sold by the city with certain stipulations as to its use. Whether the cement company agreed to all the terms of the sale was not stated. Further stipulations are that the successful bidder must construct an industrial plant on the property to cost not less than $1,000,000. The construction of the plant must commence within 60 days, according to the ordinance, and must be completed within two years from the date of the beginning. In the event of the failure to comply with the ordinance the property is to revert to the city.

Provisions are made for spur tracks, easement rights, insurance and other matters, in which the city is protected at every point. A provision added to the ordinance before its adoption makes the installation of dust collectors at the plant imperative. Although, it was pointed out, there was no reason to believe that such protection was not included in the plans of the cement company, the double assurance was deemed wise.

The completion of the deep-water channel at Stockton will permit the loading of specially constructed vessels of 25,000-bbl. capacity at the mill for the export of cement in bulk to the many seaports of the Pacific Coast, Central America and South America. The location of the mill on deep water will permit the full development of the cement trade, the announcement states.—*Stockton* (Calif.) *Record.*

Hahn-Muscatine Co. Bankrupt

THE HAHN-MUSCATINE CO., engaged in the gravel business in Muscatine, Iowa, is bankrupt, it was declared in a petition filed in United States district court in Davenport through Thompson and Thompson, attorneys of that city.

Debts amount to $108,157.64, according to the schedules of which the major portion is represented by mortgages on the company's property. Unsecured claims total $24,372.61.

Assets are listed at $27,190.66, of which nothing is claimed exempt from use for the benefit of creditors.

The company had been operated under receivership for two years in an attempt to rehabilitate it and put it on a paying basis. The bankruptcy petition was voluntary.

Charles A. Mull is president of the corporation and H. C. Hiller, secretary.—*Davenport* (Iowa) *Times.*

New Machinery and Equipment

Automatic Scale Which Weighs Material in Transit

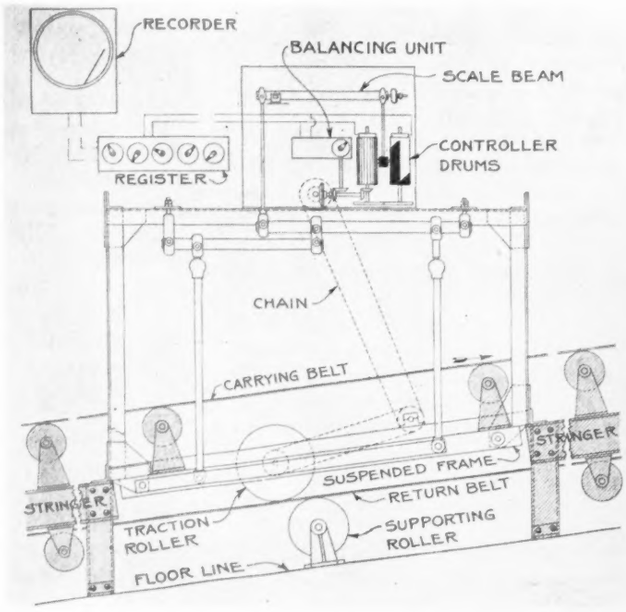
A NEW AUTOMATIC scale for continuously weighing material in transit on conveyors has been developed by John Chatillon and Sons, New York, and is known as the "Telepoise." The machine consists of a steel frame work, the lower part of which, as shown in the drawing, is a suspended type of scale. Two carrying idlers of the belt are mounted on the floating platform over which the belt travels with the load.

The weighing mechanism consists of a scale beam balanced by means of calibrated springs. Beneath the end of the beam is the integrating mechanism which consists of two drums which are caused to revolve toward each other at a speed proportional to that of the belt, by means of the traction roller and transmission as shown.

The left hand drum surface is milled into a succession of cams. The right hand drum has a smooth surface, one-half of which is metallic and one-half non-conductive. The dividing line between the metallic and non-conductive surfaces is part of a helix so that the surfaces are like two equal right angle triangles wrapped around a cylinder, fitting together along the hypothenuse. As the drums revolve a contractor suspended from the end of the weigh beam and moves in unison with it is vibrated rapidly against the surface of the drum on the right by the cams on the surface of the left drum and if brought in contact with the metallic surface of the right drum opens and closes an electric circuit; the impulses occasioned thereby, through the brushes at the top of the drums and wiring, operates an electro-mechanical device, similar in form to that of the stock ticker, fire alarm or printing telegraph, which is geared to a continuous register at a ratio to convert the impulses into pounds, tons, barrels, etc., as desired.

A 24-in. chart recorder is operated by suitable wiring from the register. The register and recorder may be installed at any distance from the machine or from each other. An ingenious load indicating device is included.

To balance the machine a lever is used to transfer a small weight to the weigh beam and automatically cuts out the load register; the controller is simultaneously connected electrically to the balancing unit, which is so arranged that it will indicate immediately whether or not the machine is in balance, and if not, what adjustment to make.



Automatic scale weighs material in transit

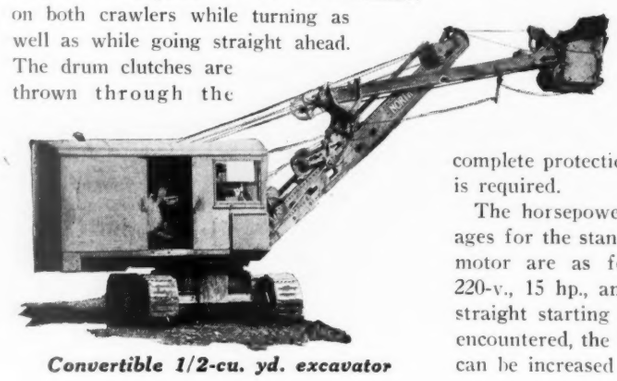
New ½ Cu. Yd. Excavator

THE NORTHWEST ENGINEERING Co., Chicago, announces a 1½ cu. yd. shovel known as the Model 6 which is convertible to a 19-ton crane, a 1½-cu. yd. dragline, and a 49-59-in. trench pullshovel.

Among the features claimed for the new machine is the positive traction maintenance on both crawlers while turning as well as while going straight ahead. The drum clutches are thrown through the "feather-touch" clutch control by the power of the engine. The main drive from the engine is through helical cut steel gears in an oil bath and running on ball and roller bearings. All high speed shafts are mounted on ball bearings.

When desired the Model 6 can be equipped with the variable speed motor, accelerator controlled, in place of the regular governor controlled motor.

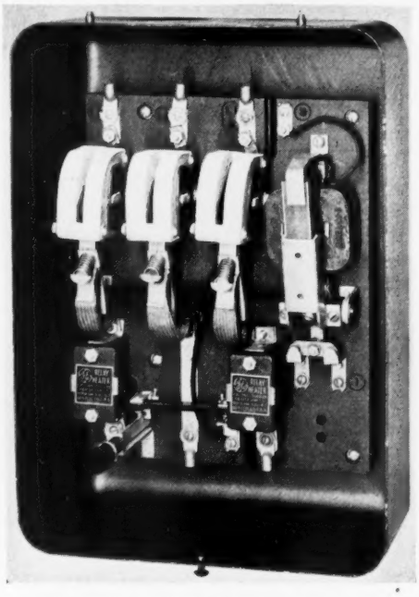
As a shovel it can be had with either the standard or "close-quarter" crowd.



Convertible 1/2-cu. yd. excavator

New Magnetic Switch

A NEW MAGNETIC switch, the CR-7006-D-30, is announced by the General Electric Co. to supersede the CR-7006-D-4, and is designed primarily for throwing small motors directly across the line. It can, however, be used as a primary switch for slipring motors having secondary control. It is recommended for use with small motors wherever a simple, direct control, providing complete protection to motor and operator, is required.



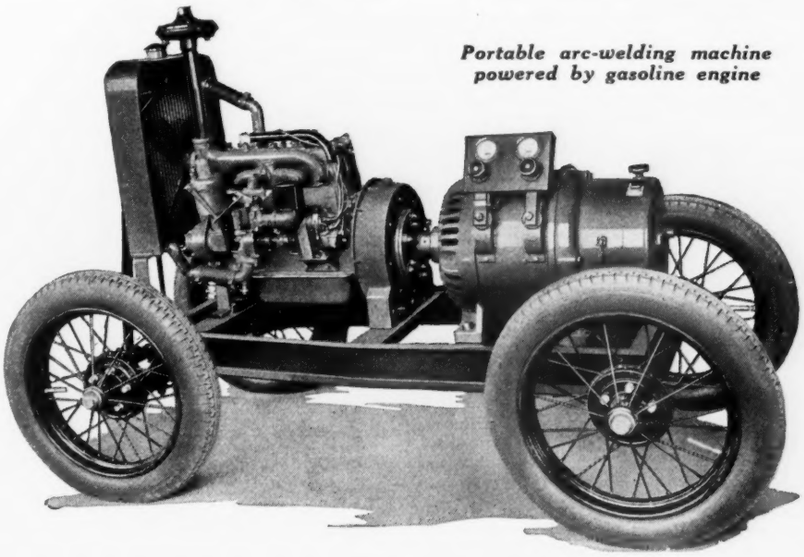
Magnetic switch for small motors

The horsepower ratings at various voltages for the standard squirrel-cage type of motor are as follows: 110-v., 7½ hp.; 220-v., 15 hp., and 440/600-v., 15 hp. For straight starting duty where no jogging is encountered, the 15 hp. rating on 440/600-v. can be increased to 20 hp.

Portable Gas-Engine-Driven Arc Welding Machine

A READILY portable arc welding machine, easily and quickly pulled to the job behind a motor truck or car, has been brought out by the Fusion Welding Corp., Chicago. The design of the machine is claimed to make unnecessary the use of several new features that insure satisfactory operation.

The carbide valve is rotated by means of a spring clock motor which, in turn, is governed by an "Oxweld" diaphragm-type, motor feed control. This rotating feed valve is self-cleaning; the carbide brushes off any dust or lime deposit as it is fed. Pressure adjustment is easily made by means



Portable arc-welding machine powered by gasoline engine

induction coils, reactors, etc., to help stabilize the air current. A large number of possible current settings are said to be possible by a single brush shifting control calibrated in amperes.

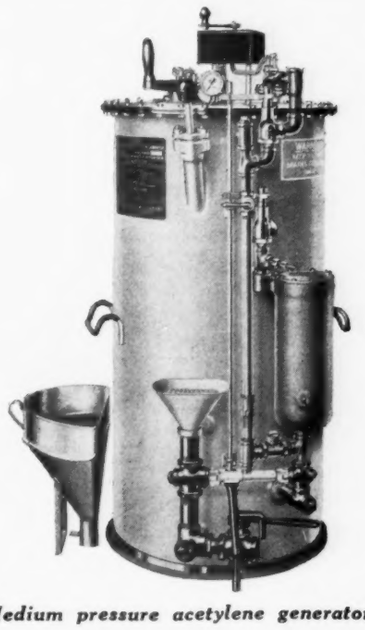
Continental motors of ample power—23 hp. for the 200-amp. and 40 hp. for the 300-amp. set—are used for power supply. An automatic governor keeps the motor speed constant and no "babying" of the arc is necessary while the motor picks up the load, it is claimed. Economy is another feature claimed for the machine, it requiring less than one gallon of gasoline per hour to run the 200-amp. set, according to the makers.

Medium-Pressure Acetylene Generator

A MEDIUM pressure acetylene generator has been announced by the Oxweld Acetylene Co., New York City, especially to meet the demand for a stationary or portable acetylene generator that can be used in connection with either medium-pressure or low-pressure welding and cutting blowpipes. This generator, designated as the "Prest-O-Weld Type MP-101," is adequate for any type of welding or cutting operation and can easily be carried from place to place on a truck or wagon, according to the announcement. Safety, dependability, sturdiness and minimum pressure fluctuation during operation are claimed to be some of the features of this generator. Its outstanding characteristic is rugged simplicity, but although simple in design, it incorporates

by a thumbscrew on the motor feed control. Fluctuation during normal operation is less than 1 lb. per sq. in., it is claimed, and even under severe load the carbide feed is regulated to limit after-generation to a maximum increase of 1 lb. per sq. in. This close regulation permits operation of the generator close to the limit of 15 lb. per sq. in. without loss of gas through the relief valves when the blowpipes are turned off.

The motor is enclosed in a dust-tight housing. The feed valve cone can be raised to seal the hopper when the generator is



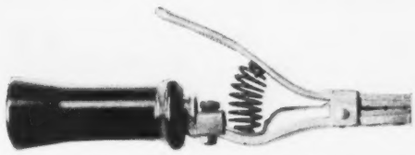
Medium pressure acetylene generator

being moved. This valve is also automatically raised, closing the hopper, every time the carbide filling door is opened. The hopper and generator body are so designed that no water will enter the hopper in case the generator is knocked over.

The Underwriters' Laboratories have permitted a double rating for the MP-101 generator, making its rated capacity 60 cu. ft. per hour, which is ample for almost any welding or cutting operation, according to the manufacturers. The carbide capacity of this generator is 30 lb. and the quarter size (¼x1½-in.) carbide is used. The weight of the generator empty is 305 lb.

New Electrode Holder

LINCOLN ELECTRIC CO., Cleveland, Ohio, announces an improved type of electrode holder (Type T) for metallic arc welding designed for greater operator convenience. The holder consists essentially of a powerful clamp to hold the welding electrode firmly while welding and with an



Improved electrode holder

easy release feature which permits changing electrodes quickly.

The handle grip is designed for easy holding and it is claimed that the holder operates exceptionally cool, because the welding current is carried from the point of cable entry to the copper jaws by copper strips of low resistance.

The copper tips on the jaws reduce the sticking of the electrode to the jaws, resulting in faster and easier change of electrodes and longer life for the holder, it is claimed. The shape of the holding clamps has been altered to give greater compactness to permit work in close corners. All metallic parts of this holder are coated with non-tarnishing cadmium plating.

Three-Speed Crane Features Automotive Shift

FLEXIBILITY EQUAL to that of a steam crane is claimed for the three-speed gasoline crane with automotive gear shift manufactured by the American Hoist and Derrick Co., St. Paul, Minn. The shift feature on the crane works like the automobile transmission; low gear for a powerful start, intermediate for average crane work and traveling, and high gear for rapid traveling.

The varying speeds are said to facilitate material handling; the light load can be handled with speed, while the heavy load can be moved slower and with more power.

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F.O.B., at producing point or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo, N. Y.	1.30	1.30	1.30	1.30	1.30	1.30
Bound Brook, N. J.	1.35	2.10	1.90	1.50	1.50	.....
Chaumont, N. Y.	.50	1.75	1.75	1.50	1.50	1.50
Chazy, N. Y.	.75	1.75	1.60	1.30	1.30	1.30
Dundas, Ont.	.53	1.05	1.05	.90	.90	.90
Farmington, Conn.	.....	1.30	1.10	1.00	1.00	.....
Frederick, Md.	.50– .75	1.35–1.45	1.15–1.25	1.10–1.20	1.05–1.15	1.05–1.10
Ft. Springs, W. Va.	.40	1.35	1.35	1.35	1.25	1.15
Munns, N. Y.	.75	1.00	1.00	1.00	.....	.....
Prospect, N. Y.	.80	1.20	1.20	1.15	1.10	.....
Rochester, N. Y.—Dolomite	1.50	1.50	1.50	1.50	1.50	1.50
St. Vincent de Paul, Que. (n)	.65	1.25	1.05	.95	.85	1.00
Shaw's Junction, Penn.	.85e	.....	1.35e	1.35e	1.35e	1.35e
Syracuse, N. Y.	.50	1.00	1.00	1.00	1.00	1.00
Watertown, N. Y.	1.00	1.75	1.75	1.50	1.50	1.50
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL:						
Afton, Mich.	.....	.....	.....	.50	.....	1.50
Alton, Ill.	1.85	.....	1.85	.....	.....	.....
Cape Girardeau, Mo.	1.25	1.25	1.25	1.25	1.00	.....
Columbia and Krause, Ill.	1.05–1.40	.95–1.50	1.15–1.50	1.05–1.50	1.05–1.50	.....
Cypress, Ill.	1.60	1.00	1.10	1.00	1.00	1.25
Davenport, Iowa (f)	1.00	1.50	1.50	1.30	1.30	1.40
Dubuque, Iowa	.95	.95	.95	1.10	1.10	1.10
Stolle and Falling Springs, Ill.	1.05–1.70	.95–1.70	1.15–1.70	1.05 1.70	1.05–1.70	.....
Greencastle, Ind.	1.25	1.10	1.10	1.10	1.00	1.00
Lannon, Wis.	.90	1.00	1.00	.90	.90	.90
McCook, Ill.	1.00	1.25	1.25	1.25	1.25	1.25
Marblehead, Ohio (l)	.55	.80	.80	.80	.80	.80
Milltown, Ind.	.....	.90–1.00	1.00–1.10	.90–1.00	.85– .90	.85– .90
Northern Ohio points	.85–1.15	1.25	1.15	1.15	1.15	1.15
Sheboygan, Wis.	1.10	1.10	1.10	1.10	1.10	1.10
Stone City, Iowa	.75	.....	1.20	1.00	1.00	.....
Thornton, Ill.	.90	1.00	1.25	1.25	1.25	1.25
Toledo, Ohio	1.10	1.70	1.70	1.70	1.70	1.70
Toronto, Canada	2.50	3.00	2.85	2.85	2.85	2.85
Valmeyer, Ill. (fluxing limestone)	.90–1.20	.....	.....	1.75	.....	1.75
Waukesha, Wis.	.....	.90	.90	.90	.90	.....
Winona, Minn.	1.00	1.20	1.30	1.40	1.40	1.40
Wisconsin points	.50	.....	1.00	.90	.90	.....
Youngstown, Ohio	1.00	1.00	1.25	1.25	1.25	1.25
SOUTHERN:						
Cartersville, Ga.	1.00	1.65	1.65	1.35	1.15	1.15
Chico, Texas	1.00	1.30	1.30	1.25	1.20	.....
Cutler, Fla.	.....	.50– .75r	.....	1.50–1.75r	.....	1.10r
El Paso, Texas	.50r	1.00–1.50	1.00–1.50	1.00	1.00	.75
Graystone, Ala.	Crusher run, screened, $1 per ton					
Olive Hill, Ky.	.90	1.00	1.00	.90	.90	.90
Rocky Point, Va.	.50– .75	1.40–1.60	1.30–1.40	1.15–1.25	1.10–1.20	1.00–1.05
WESTERN:						
Atchison, Kan.	.50	1.80	1.80	1.80	1.80	1.80
Blue Springs and Wymore, Neb.	.25	1.45	1.45	1.35c	1.25d	1.20
Cape Girardeau, Mo.	1.00	1.25	1.25	1.25	1.00	.....
Rock Hill, St. Louis, Mo.	1.45	1.45	1.45	1.45	1.45	1.45

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Birdsboro, Penn. (q)	1.20	1.60	1.45	1.35	.....	1.30
Branford, Conn.	.80	1.70	1.45	1.20	1.05	.....
Eastern Maryland	1.00	1.60	1.60	1.50	1.35	1.35
Eastern Massachusetts	.85	1.75	1.75	1.25	1.25	1.25
Eastern New York	.75	1.25	1.25	1.25	1.25	1.25
Eastern Pennsylvania	1.10	1.70	1.60	1.50	1.35	1.35
Knippa, Texas	2.50	2.00	1.55	1.25	1.25	1.25
New Britain, Plainville, Rocky Hill, Wallingford, Meriden, Mt. Carmel, Conn.	.80	1.70	1.45	1.20	1.05	.....
Northern New Jersey	1.35–1.40	1.40–2.10	1.80–1.90	1.50–1.60	1.50–1.60	.....
Richmond, Calif.	.75	.....	1.00	1.00	1.00	.....
Spring Valley, Calif.	.90–1.25	.90–1.25	.90–1.25	.90–1.25	.90–1.25	.90–1.25
Springfield, N. J.	1.40	2.00	1.90	1.60	1.60	.....
Toronto, Canada	.....	5.80	4.05	.....	.....	.....
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	.....

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Berlin, Utley, Montello and Red Granite, Wis.—Granite	1.80	1.70	1.50	1.40	1.40	.....
Cayce, S. C.—Granite	.....	.....	1.75	1.75	1.60	.....
Eastern Pennsylvania—Sandstone	1.35	1.70	1.65	1.40	1.40	1.40
Eastern Pennsylvania—Quartzite	1.20	1.35	1.25	1.20	1.20	1.20
Emathla, Fla.—Flint rock	.....	.....	2.25–2.50s	.....	.....	.....
Lithonia, Ga.—Granite	.75	1.75	1.60	1.25	1.25	.....
Lohrville, Wis.—Granite	1.65	1.70	1.65	1.45	1.50	.....
Middlebrook, Mo.	3.00–3.50	.....	2.00–2.25	2.00–2.25	.....	1.25–3.00
Richmond, Calif.—Quartzite	.75	.....	1.00	1.00	1.00	.....
Somerset, Penn. (sand-rock)	1.50 to 1.85					
Toccoa, Ga.—Granite	1.50	.....	1.50	1.35	1.30	1.25

(a) Sand. (b) to ⅛ in. (c) 1 in., 1.40. (d) 2 in., 1.30. (e) Price net after 10c cash discount deducted. (f) High calcite fluxing limestone, 92–98% CaCO, 1.75. (g) Run of quarry. (h) Less 10c discount. (j) Less 10% net ton. (k) Rubble stone. (l) Less .05. (n) Ballast R. R., .90; run of crusher, 1.00. (p) Carload prices. (q) Crusher run, 1.40; ¼-in. granolithic finish, 3.00. (r) Cubic yard. (s) 1-in. and less, per cubic yard.

Agricultural Limestone

(Pulverized)

Alton, Ill.—Analysis, 99% $CaCO_3$; .03% $MgCO_3$; 90% thru 100 mesh 5.00

Bettendorf and Moline, Ill.—Analysis, $CaCO_3$, 97%; 2% $MgCO_3$; 50% thru 100 mesh, 1.50; 50% thru 4 mesh **1.50**

Blackwater, Mo.—100% thru 4 mesh **1.00**

Branchton, Penn.—100% thru 20 mesh, 60% thru 100 mesh, 45% thru 200 mesh a5.00

Cape Girardeau, Mo.—Analysis, $CaCO_3$, 94½%; $MgCO_3$, 3½%; 90% thru 50 mesh **1.50**

Cartersville, Ga.—90% thru 100 mesh, 2.00; 50% thru 50 mesh **1.50**

Chaumont, N. Y.—Pulverized limestone, bags, 4.00; bulk **2.50**

Cypress, Ill.—Analysis, 94-98% $CaCO_3$, 2% $MgCO_3$; 90% thru 100 mesh, 1.35; 50% thru 100 mesh, 1.15; 90% thru 50 mesh, 1.15; 50% thru 50 mesh, 1.05; 90% thru 4 mesh, 1.10; 50% thru 4 mesh **1.00**

Danbury, Conn., and West Stockbridge, Mass.—Analysis, 90% $CaCO_3$; 5% $MgCO_3$; fine ground, 90% thru 100 mesh; bulk **3.50**

Paper bags **4.75**

100-lb. cloth bags **5.25**

(All prices less .25 cash 15 days)

Davenport, Ia.—Analysis, 97% $CaCO_3$; 2% and less $MgCO_3$; 90% thru 200 mesh, bags, per ton **6.00**

90% thru 20 mesh, bulk, per ton **1.50**

Hillsville, Penn.—Analysis, 94% $CaCO_3$; 1.40% $MgCO_3$; 75% thru 100 mesh; sacked **5.00**

Jamesville, N. Y.—Analysis, 89% $CaCO_3$, 4% $MgCO_3$; pulverized; bags, 4.25; bulk **2.75**

Joliet, Ill.—Analysis, 52% $CaCO_3$; 48% $MgCO_3$; 90% thru 100 mesh **3.50**

Knoxville, Tenn.—Analysis, 52% $CaCO_3$; 36% $MgCO_3$; 80% thru 100 mesh, bags, 3.75; bulk 2.50

Marlbrook, Va.—Analysis, 80% $CaCO_3$; 10% $MgCO_3$; bulk **1.75**

Marl — Analysis, 95% $CaCO_3$; 0% $MgCO_3$; bulk **2.25**

Marion, Va.—Analysis, 90% $CaCO_3$, 2% $MgCO_3$; per ton **2.00**

Middlebury, Vt.—Analysis, 99.05% $CaCO_3$; 90% thru 50 mesh 4.25

Milltown, Ind.—Analysis, 94.50% $CaCO_3$, 33% thru 50 mesh, 40% thru 50 mesh; bulk **1.35–1.60**

Olive Hill, Ky.—Analysis, $CaCO_3$ 94-98%; 50% & 90% thru 4 mesh **1.00**

Piqua, Ohio—Total neutralizing power 101.12%; 60% thru 100 mesh **2.50**

100% thru 10, 90% thru 50, 70% thru 100; bags, 5.00; bulk **3.50**

100% thru 4, 30% thru 100, bulk **1.50**

Rocky Point, Va. — Analysis, $CaCO_3$, 97%; $MgCO_3$, 75%; 50% thru 200 mesh, burlap bags, 3.50; paper, 3.25; bulk **2.00**

Watertown, N. Y. — Analysis, 53.72% $CaCO_3$; pulverized; sacks, 4.25; bulk **2.75**

(a) Less 50c comm. to dealers per ton.

Agricultural Limestone

(Crushed)

Bedford, Ind.—Analysis, 98.50% $CaCO_3$; 50% $MgCO_3$; 90% thru 10 mesh 1.50

30% thru 100 mesh **1.50**

(Continued on next page)

Agricultural Limestone

Cape Girardeau, Mo.—Analysis, 94½% $CaCO_3$, 3½% $MgCO_3$; 50% thru 50 mesh 1.50

Chico and Bridgeport, Tex. — Analysis, 95% $CaCO_3$; 1.3% $MgCO_3$; 90% thru 4 mesh 1.00–1.25

Charles-Town, W. Va.—Lime Marl—Analysis, 95% $CaCO_3$, 50% thru 100 mesh, bulk, 3.00; including burlap bags 4.50

Colton, Calif.—100% thru 16 mesh, bulk, 4.00; including sacks 5.00

Davenport, Ia.—Analysis, 97% $CaCO_3$; 2% and less $MgCO_3$; 90% thru 10 mesh, per ton 1.25

90% thru 4 mesh, per ton 1.10

Dubuque, Iowa—Analysis, 54% $CaCO_3$; 38% $MgCO_3$; 90% thru 50 mesh ..... .95

Dundas, Ont.—Analysis, 54% $CaCO_3$; $MgCO_3$, 43%; 50% thru 50 mesh 1.00

Ft. Spring, W. Va. — Analysis, 90% $CaCO_3$; 4% $MgCO_3$; 50% thru 100 mesh 1.50

Hillsville, Penn.—Analysis, 94% $CaCO_3$, 1.40% $MgCO_3$; 75% thru 100 mesh, sacked 5.00

Kansas City, Mo.—50% thru 100 mesh 1.00

Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% thru 10 mesh; 46% thru 60 mesh 2.00

Screenings (¼ in. to dust) 1.00

Marblehead, Ohio—90% thru 100 mesh 3.00

90% thru 50 mesh 2.00

90% thru 4 mesh 1.00

McCook, Ill.—90% thru 4 mesh ..... .95

Middlepoint, Bellevue, Bloomville, Kenton and Whitehouse, Ohio; Monroe, Mich.; Bluffton, Greencastle and Kokomo, Ind. —85% thru 10 mesh, 25% thru 100 mesh 1.50

Moline, Ill., and Bettendorf, Iowa—Analysis, 97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh 1.50

Mountville, Va. — Analysis, 76.60% $CaCO_3$; $MgCO_3$, 22.83%, 100% thru 20 mesh; 50% thru 100 mesh, paper bags, 4.50; burlap bags 5.00

Stolle and Falling Springs, Ill.—Analysis, 89.9% $CaCO_3$, 3.8% $MgCO_3$; 90% thru 4 mesh 1.15–1.70

Stone City, Iowa — Analysis, 98% $CaCO_3$; 50% thru 50 mesh ..... .75

West Stockbridge, Mass.—Analysis, 95% $CaCO_3$; 50% thru 50 mesh, bulk 3.50

100 lb. paper bags, 4.25*; cloth 5.25

Waukesha, Wis.—90% thru 100 mesh, 4.50; 50% thru 100 mesh 2.10

Valmeyer, Ill.—Analysis, 96% $CaCO_3$, 2% $MgCO_3$; 100% thru 10 mesh 1.10–1.70

*Less 25c cash 15 days.

Pulverized Limestone for Coal Operators

Davenport, Ia.—Analysis 97% $CaCO_3$; 2% and less $MgCO_3$; 100% thru 20 mesh, 50% thru 200 mesh; paper sacks 6.00

Hillsville, Penn., sacks, 5.10; bulk 3.50

Joliet, Ill.—Analysis, 52% $CaCO_3$; 48% $MgCO_3$; 95% thru 100 mesh; paper bags (bags extra) 3.50

Marblehead, Ohio — Analysis, 83.54% $CaCO_3$; 14.92% $MgCO_3$; 99.8% thru 100 mesh; sacks 4.25

Piqua, Ohio—99% thru 100 mesh, bulk, 3.50; in 80-lb. bags (f.o.b. Piqua) 5.00

Rocky Point, Va.—Analysis, 97% $CaCO_3$; 75% $MgCO_3$; 85% thru 200 mesh, bulk 2.25–3.50

Shaw's Junction, Penn.—Analysis, 91.55% $CaCO_3$; 96% $MgCO_3$; 70% thru 100 mesh, bulk 4.50

Waukesha, Wis.—50% thru 100 mesh, bulk 2.10

Glass Sand

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

Cedarville and S. Vineland, N. J. *1.75–2.25

Cheshire, Mass., in carload lots 5.00–7.00

Estill Springs and Sewanee, Tenn. 1.50

Franklin, Penn. 2.00

Klondike, Mo. 2.00

Massillon, Ohio 3.00

Michigan City, Ind. ..... .30– .35

Ohlton, Ohio 2.50

Ottawa, Ill. 1.25

Red Wing, Minn. 1.50

San Francisco, Calif. 4.00–5.00

Silica and Mendota, Va. 2.00

St. Louis, Mo. 2.00

Utica and Ottawa, Ill. 75–1.00

Zanesville, Ohio 2.50

Miscellaneous Sands

City or shipping point	Roofing sand	Traction
Beach City, Ohio		1.50
Dresden, Ohio		1.25
Eau Claire, Wis.	4.30	.40–1.00
Estill Springs and Sewanee, Tenn.	1.35–1.50	1.35–1.50
Franklin, Penn.		1.75
Massillon, Ohio		2.00
Michigan City, Ind.		.30

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, F.O.B., producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Asbury Park, Farmingdale, Spring Lake and Wayside, N. J.	.50	.50	1.15	1.25	1.25	
Attica and Franklinville, N. Y.	.65	.65	.65	.65	.65	.65
Boston, Mass.‡	1.40	1.40	2.25		2.25	2.25
Buffalo, N. Y.	1.00	1.05	1.05			
Erie, Penn.	.65	.90	1.30	1.30	1.30	
Leeds Junction, Me.		.50	1.75		1.25	1.00
Machias Jct., N. Y.	.75	.75	.75		.75	.75
Milton, N. H.		.50				.90
Montoursville, Penn.	1.00	.75	.60	.60	.60	.60
Morrisville, Penn.	.50	.40	.90	1.00	1.00	
Northern New Jersey	.50	.50	1.25	1.25	1.25	
Somerset, Penn.		**2.00**				
South Portland, Me.		1.00	2.25			2.00
Troy, N. Y.	**.50– .75***	**.50– .75***	**.80–1.00***	**.80–1.00***		**.80–1.00***
F. o. b. boat, per yd.	**1.50**	**1.50**	**1.75**	**1.75**		**1.75**
Washington, D. C.	.60	.60	1.20	1.20	1.00	1.00
Georgetown, D. C.	.55	.55	1.20	1.20	1.00	1.00
CENTRAL:						
Algonquin, Ill.	.50	.35	.25	.45	.45	.50
Appleton, Minn.		.50	1.25		1.50	
Attica, Ind.			**All sizes .75–.85**			
Barton, Wis.		.40s	.50s	.65s	.65s	.65s
Chicago, Ill.	**.50**	**.50–1.45n**	**.60**	**.60–1.55n**	**.60**	**.60–1.90x**
Chicago, Ill.	**.30**	**.20**	**.30**	**.40**	**.40**	**.45**
Columbus, Ohio		.75‖	.75‖	.75‖	.75‖	
Des Moines, Iowa		.60	1.50	1.50	1.50	1.50
Eau Claire, Chippewa Falls, Wis.	.40	.40	.55	.85	.85	
Elkhart Lake and Glenbeulah, Wis.	.50	.30	.30	.50	.50	.60
Ferrysburg, Mich.		**.50– .80**	**.60–1.00**	**.60–1.00**		**.50–1.25**
Grand Haven, Mich.		.60		.90		.90
Grand Rapids, Mich.	**.50**	**.50**	**.90**	**.80**	**.70**	**.70**
Hamilton, Ohio		.85	.85		.85	
Hersey, Mich.		.50		.60	.75	.75
Humboldt, Iowa	.50	.50	1.40	1.40	1.40	1.40
Indianapolis, Ind.	.50– .75	.40– .60	.50– .75	.50– .75	.60– .85	.60– .85
Mankato, Minn. (h)	.55	.45			1.25	
Mason City, Iowa		.60	.85	1.25	1.25	1.25
Mattoon, Ill.			**.75–.85 all sizes**			
Milwaukee, Wis.	.91	.91	1.06	1.06	1.06	1.06
Minneapolis, Minn. (g)	.35	.35	1.35	1.35	1.35	1.25
St. Louis, Mo. (b)	1.30e	1.30f	1.55t	1.55	1.55	1.65
St. Louis, Mo.†	2.00e	2.00f	2.25t	2.25	2.25	2.35
St. Paul, Minn.	.35	.35	1.25	1.25	1.25	1.25
Terre Haute, Ind.	.75	.60	.75	.75	.75	.75
Waukesha, Wis.		**.45**	**.60**	**.60**	**.65**	**.65**
Winona, Minn.	**.40**	**.40**	**.50**	**1.10**	**1.10**	**1.25**
SOUTHERN:						
Brewster, Fla.	.50	.50				
Brookhaven, Miss.	**1.25**	**.70**	**1.25**	**1.00**	**.70**	**.70**
Charleston, W. Va.			**River sand and gravel, all sizes, 1.40**			
Eustis, Fla.		.50				
Fort Worth, Texas	1.00	1.00	1.00	1.00	1.00	1.00
Gainesville, Texas					.55	
Knoxville, Tenn.	.85	.85	1.50	1.20	1.20	1.20
Macon, Ga.	**.65– .90**	**.65– .90**	**2.25–2.50**	**2.25–2.50**	**2.25–2.50**	**2.25–2.50**
New Martinsville, W. Va.	**1.10**	**1.00**		**1.30**	**1.10**	**.90**
Roseland, La.	.30	.30	1.00	1.00	.80	.80
WESTERN:						
Kansas City, Mo.	**.70– .80**	**.70– .75**				
Crushton, Durbin, Kincaid, Largo, Rivas, Calif.	**.10– .40**	**.10– .40**	**.50–1.00**	**.50–1.00**	**.50–1.00**	**.50–1.00**
Los Angeles, Calif.	.10– .40	.10– .40	.20– .90	.50– .90	.50– .90	.50– .90
Oregon City, Ore.			**All grades range from 1.00 to 1.25 per cu. yd.**			
Otay, Calif.		**.35– .40**	**.50– .60**	**.50– .60**	**.50– .60**	**.50– .60**
Phoenix, Ariz. (k)	**1.25***	**1.15***	**1.50***	**1.15***	**1.15***	**1.00***
Pueblo, Colo.	.70	.60		1.20		1.15
Seattle, Wash.	**1.25***	**1.25***	**1.25***	**1.25***	**1.25***	**1.25***
Steilacoom, Wash.	.50	.50	.50	.50	.50	.50

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
Algonquin and Beloit, Wis.			.40			
Appleton, Minn.	.55					
Brookhaven, Miss.						.60
Buffalo, N. Y.	1.10	.95		.85		.95
Burnside, Conn.		.75*				
Chicago, Ill.	1.25m			.35		
Des Moines, Iowa				.85		
Dresden, Ohio				.70	.65	
Eau Claire, Chippewa Falls, Wis.					.65	
Fort Worth, Texas						.60
Gainesville, Tex.					.55	
Grand Rapids, Mich.				.50		
Hamilton, Ohio					.70	
Hersey, Mich.				.50		
Indianapolis, Ind.			Mixed gravel for concrete work, at .65			
Macon, Ga.	.35					
Mankato, Minn.	.70					
Oregon City, Ore.	1.25*	1.25*	1.25*	1.25*	1.25*	1.25*
Roseland, La.				.60	.60	.60
Somerset, Penn.		1.85–2.00		1.50–1.75		
Steilacoom, Wash.	.25					
St. Louis, Mo.			Mine run gravel, 1.55 per ton			
Summit Grove, Ind.	.50	.50	.50	.50	.50	.54
Winona, Minn.						.60
York, Penn.	1.10	1.00				

*Cubic yd. ‡Delivered on job by truck. (a) ¾-in. down. (b) 1½- to ¼-in., 1.65. (c) 2½-in. and less. ‖By truck only. (d) Delivered in Hartford, Conn., $1.50 per yd. (e) Mississippi River. (f) Meramee River. (g) Per yd., del. by truck, ¼-in. down, 1.25; 2 in. and less, 2.40. (h) ¼- to ¾-in., 1.25. (j) Lake sand, 1.75, delivered. (k) 60–70% crushed boulders. (m) Cu. yd., dune sand, f.o.b. cars, Chicago. (n) Cu. yd., f.o.b. cars, Chicago. (r) Pit run. (s) Plus 15c for winter loading. (t) Fine and regular binder. (u) Coarse, torpedo, also roofing. (v) Coarse binder. †2% discount if paid by 15th of month following delivery.

Core and Foundry Sands

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

City or shipping point	Molding, fine	Molding, coarse	Molding, brass	Core	Furnace lining	Sand blast	Stone sawing
Albany, N. Y.	2.25	2.00	2.25			3.75	
Beach City, Ohio	1.75	1.75		1.50	1.50		
Cheshire, Mass.	Sand for soap, 7.00–8.00					6.00–8.00	
Dresden, Ohio	1.25–1.50	1.25–1.50	1.50–1.75	1.00 1.25			
Eau Claire, Wis.						2.50–3.00	
Elco, Ill.	Ground silica, 90-99½% thru 325 mesh, 16.00–40.00 per ton						
Estill Springs and Sewanee, Tenn.	1.25			1.25		1.35–1.50	
Franklin, Penn.	1.75	1.75		1.75			
Kasota, Minn.							1.00
Kerrs, Ohio	1.10–1.50	1.25–2.00	2.00			2.75–3.00	
Klondike, Mo.	2.00			2.00	2.00		
Massillon, Ohio	2.25	2.25		2.25	2.50		
Michigan City, Ind.				.30– .35			
Montoursville, Penn.				1.50			
New Lexington, Ohio	2.00	1.25	2.00				
Ohlton, Ohio	1.75	1.75		2.00	1.75	1.75	
Ottawa, Ill.	1.25–3.25	2.25	1.25–3.25	1.25–3.25	1.25	3.50	3.00
Red Wing, Minn. (d)					1.50	3.00	1.50
San Francisco, Calif.[1]	3.50†	5.00†	3.50†	3.50–5.00†	3.50–5.00†	3.50–5.00†	
Silica, Mendota, Va.	Potters sand, 8.00–10.00g						1.75
Utica and Ottawa, Ill.	.40–1.00f	.40–1.00f	.75–1.00	.40–1.00f	.60–1.00f	2.23–3.25	1.00–3.25
Utica, Ill.	.60	.70		.75	1.00		
Warwick, Ohio	1.50*–2.00h	1.50*–2.00h		1.50*–2.00h			
Zanesville, Ohio	2.00	1.50	2.00	2.50	2.00		

*Green. †Fresh water washed, steam dried. [1]Core, washed and dried, 2.50. (d) Filter sand, 3.00. (e) Filter sand, 3.00–4.25. (f) Crude and dry. (g) Also 12.00; building sand, 1.75–2.00. (h) Washed, 1.75.

Crushed Slag

City or shipping point	Roofing	¼ in. down	½ in. and less	¾ in. and less	1½ in. and less	2½ in. and less	3 in. and larger
EASTERN:							
Buffalo, N. Y., Erie and Du Bois, Penn.	2.25	1.25	1.25	1.35	1.25	1.25	1.25
Eastern Penn.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Northern New Jersey	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Reading, Penn.	2.00	1.00		1.25			
Western Pennsylvania	2.50	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Ironton, Ohio		1.30*		1.45*		1.45*	
Jackson, Ohio		1.05*		1.30*	1.05*	1.30*	
Toledo, Ohio	1.50	1.10	1.25	1.25	1.25	1.25	1.25
SOUTHERN:							
Ashland, Ky.		1.45*		1.45*	1.45*	1.45*	
Ensley and Alabama City, Ala.	2.05	.55	1.25	1.15	.90	.90	.80
Longdale, Roanoke, Ruesens, Va.	2.50	.75	1.25	1.25	1.25	1.15	1.05
Woodward, Ala.†	2.05	.55*		1.15*	.90*	.90*	

5c per ton discount on terms. †1¼ in. to ¼ in., $1.05; ⅝ in. to 10 mesh, $1.25*; ⅝ in. to 0 in., .90*; ¼ in. to 10 mesh, .80*.

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

EASTERN:	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk.	Ground burnt lime, Bags	Lump lime, Blk.	Lump lime, Bbl.
Berkeley, R. I.			12.00			18.00		2.00
Buffalo, N. Y.	11.50	7.50	7.50	12.00	8.00	11.00	7.50	1.50[16]
Lime Ridge, Penn.							5.00	
West Stockbridge, Mass.	12.00	10.00	5.60					2.00[13]
Williamsport, Penn.	10.00–11.00	8.50–9.00	8.50–9.00		7.00	9.00	5.00	
York, Penn., & Oranda, Va.	11.50[7]	8.50–9.50[7]	8.50–9.50[7]	8.50–10.50[7]	8.00	9.25	7.00	1.40[8]
CENTRAL:								
Afton, Mich.						10.75	7.50	12.11
Carey, Ohio	11.50	7.50	7.50		8.00		7.50	1.50
Cold Springs, Ohio		6.50	6.50					
Gibsonburg, Ohio	9.50				8.00	10.00		
Huntington, Ind.	11.50	7.50	7.50	12.00	8.00	11.00	7.50	1.50[16]
Luckey, Ohio	11.50							
Milltown, Ind.		8.50–10.00		10.00[8]			8.50[32]	1.35[10]
Ohio points	11.50	7.50	7.50	12.00	8.00	11.00[23]	7.50	1.50[16]
Scioto, Ohio	10.50	7.50	7.50	8.50	8.00	.62½	7.00	1.50
Sheboygan, Wis.		10.50					9.50	2.00[4]
Wisconsin points[6]		11.50					9.50	
Woodville, Ohio[26]	9.50	6.50	6.50	10.50[24]	8.00	10.00[9]	8.00	1.40[3]
SOUTHERN:								
El Paso, Texas							7.00	1.50
Frederick, Md.		8.00–9.50	8.00–9.50			9.50[35]	7.00[18]	
Graystone & Landmark, Ala.	12.50	9.00		12.50	8.50		7.50	1.35
Keystone, Ala.		9.00	8.00	9.00	9.00	11.00	7.50	1.35
Knoxville, Tenn.	17.00	9.00	9.00	9.00	7.50	.62½	7.50	1.35
Ocala and Kendrick, Fla.		11.00						.75[21]
WESTERN:								
Kirtland, N. M.							10.00	
Los Angeles, Calif.	15.00	14.00	12.00	18.00			13.50	
San Francisco, Calif.	19.50	15.00	13.00	15.00–19.00	14.50[20]	.90[17]	14.50[19]	1.85[17]
Tehachapi, Calif.[33]	10.80		6.75[11]	12.00			10.30	
Seattle, Wash.	19.00	19.00	12.00	19.00	19.00		18.60	2.30

[1] Barrels. [2] Net ton. [3] Wooden, steel 1.60. [4] Steel; in bbl. .95. [5] Dealers' prices, net 30 days less 25c discount per ton on hydrated lime and 5c per bbl. on lump if paid in 10 days. [7] In paper bags, including bags. [8] To 11.00. [9] 80-lb. [10] In bags. [11] Refuse or air slack, 10.00–12.00. [12] To 3.00. [13] Delivered in Southern California. [15] To 8.00. [16] To 1.70. [17] Less credit for return of empties. [18] 90-lb. sacks. [19] To mortar plant and large industrials, 13.00. [20] Also 13.00. [21] Per ½-bbl. bag. [22] To 9.00. [23] Per bbl., 2.15. [24] Superfine, 99.5% thru 200 mesh. [25] To 16.50. [26] General purpose hydrated lime in 10-lb. paper sacks, 12.50 per ton.

Miscellaneous Sands

(Continued)

City or shipping point	Roofing sand	Traction
Montoursville, Penn.		1.25
Ohlton, Ohio	1.75	1.75
Ottawa, Ill.	1.25	1.25
Red Wing, Minn.		1.00
San Francisco, Calif.	3.50	3.50
Silica, Va.		1.75
Utica and Ottawa, Ill.	1.00–3.25	.75
Warwick, Ohio		2.00
Zanesville, Ohio		2.50

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point.

Chatsworth, Ga.:
- Crude talc, per ton 5.00
- Ground talc (20-50 mesh), bags 7.50
- Ground talc (150-200 mesh), bags 10.00
- Pencils and steel crayons, gross 1.50– 2.50

Chester, Vt.:
- Ground talc (150-200 mesh), paper bags (bags extra) 8.00– 8.50
- Same, including 50-lb. bags 9.00– 9.50

Chicago and Joliet, Ill.:
- Ground (150-200 mesh), bags 30.00

Clifton, Va.:
- Crude talc, per ton 4.00
- Ground talc (150-200 mesh), in bags 12.00

Conowingo, Md.:
- Crude talc, bulk 4.00
- Ground talc (150-200 mesh), in bags 14.00
- Cubes, blanks, per lb. .10

Dalton, Ga.:
- Crude talc (for grinding) 4.00
- Ground talc (150-200 mesh), bags 9.00
- Pencils and steel worker's crayons, per gross 1.00– 2.00

Emeryville, N. Y.:
- Ground talc (200 mesh), bags 13.75
- Ground talc (325 mesh), bags 14.75

Hailesboro, N. Y.:
- Ground talc (300-350 mesh) in 200-lb. bags 15.50–20.00

Henry, Va.:
- Crude (mine run) 3.50– 4.00
- Ground talc (150-200 mesh), bags 6.25–10.50

Joliet, Ill.:
- Ground talc (200 mesh) in bags:
- California white 30.00
- Southern white 20.00
- Illinois talc 10.00
- Crude talc 3.75

Keeler, Calif.:
- Ground (200-300 mesh), bags 20.00–30.00

Los Angeles, Calif.:
- Ground talc (150-200 mesh) in bags 15.00–24.00

Natural Bridge, N. Y.:
- Ground talc (300-325 mesh), bags 12.00–15.00

(a) Bags extra.

Rock Phosphate

Prices given are per ton (2240-lb.) f.o.b. producing plant or nearest shipping point.

Lump Rock

- Columbia, Tenn.—B.P.L. 65-70% 3.50– 4.50
- Gordonsburg, Tenn.—B.P.L. 65-70% 3.75– 4.00
- Mt. Pleasant, Tenn.—B.P.L., 75% 6.50
- Tennessee — F.o.b. mines, gross ton, unground brown rock, B.P.L. 72% 5.00
- B.P.L. 75% 6.00
- Twomey, Tenn.—B.P.L. 65%, 2000 lb. 8.00– 9.00

Ground Rock (2000 lb.)

- Centerville, Tenn.—B.P.L. 65% 8.00
- Gordonsburg, Tenn.—B.P.L. 65–70% 3.75– 4.50
- Mt. Pleasant, Tenn.—Lime phosphate:
- B.P.L., 73%, 80% thru 300 mesh 11.80
- B.P.L. 72% 5.00
- Twomey, Tenn.—B.P.L. 65% 8.00
- Wales, Tenn.—B.P.L. 65% 11.00

Florida Phosphate

(Raw Land Pebble) (Per Ton)

- Florida—F.o.b. mines, gross ton, 68/66% B.P.L., Basis 68% 3.25
- 70% min. B.P.L., Basis 70% 3.75

Mica

Prices given are net, f.o.b. plant or nearest shipping point.

- Bedford, N. Y.—Mine scrap 12.50–14.70
- New York City, N. Y.—Per lb.,
- Cut mica (1½x2) 1.60
- Cut mica (8x10) 26.00
- Pringle, S. D.—Mine run, per ton 125.00
- Punch mica, per lb. .96
- Scrap, per ton, carloads 20.00
- Rumney Depot, N. H.—Per ton,
- Mine run 300.00
- Clean shop scrap 27.00
- Mine scrap 20.00
- Roofing mica 38.00
- Punch mica, per lb. .05– .12
- Trimmed mica; 50% disc. from list, per ton, 20 mesh, 32.50; 40 mesh, 38.00; 60 mesh, 40.00; 100 mesh, 60.00; 200 mesh 70.00

Special Aggregates

Prices are per ton f.o.b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco-chips
Brandon, Vt.—English pink, cream, and American Botticino, coral pink, pearl blush	‖12.50–‖14.50	¶12.50–‖14.50
Brighton, Tenn.—Pink marble chips	§3.00	§3.00
Crown Point, N. Y.—Mica Spar		¶9.00–‖12.00
Davenport, Ia.—White limestone, in ba	6.00	6.00
Easton, Penn.—Royal green	16.00–20.00a	
Harrisonburg, Va. — Bulk marble (crushed, in bags)	12.50–14.00	12.50–14.00
Ingomar, Ohio — Concrete facings and stucco dash		11.00–18.00
Middlebrook, Mo.—Red		20.00–25.00
Middlebury, Vt. — Middlebury white		‖9.00–¶10.00
Middlebury and Brandon, Vt.—Caststone, per ton, including bags		5.50
Phillipsburg, N. J.—Royal green granite		18.00–20.00
Randville, Mich.—Crystalite white marble, bulk	4.00	4.00– 7.00
Stockton, Calif.—"Nat-rock" roofing grits		12.00–20.00
Tuckahoe, N. Y.—Tuckahoe white	8.00	
Warren, N. H.		7.90– 8.40
Wellsville, Colo.—Colorado Travertine Stone	15.00	15.00
Whitestone, Ga.	b5.00	

†C.L.; L.C.L. 16.00. ¶C.L. ‖L.C.L. (a) Including bags. (b) In burlap bags, 2.00 per ton extra. *Per 100 lb.

Soda Feldspar

DeKalb Jct., N. Y.—Color, white; analysis, K_2O, 2.11%; Na_2O, 6.86%; SiO_2, 74.04%; Fe_2O_3, .063%; Al_2O_3, 14.59%; pulverized, 100% thru 200 mesh, in bags, per ton, 22.00, bulk 20.00; 100% thru 140 mesh, in bags, per ton, 20.00; bulk 18.00

Potash Feldspar

Auburn and Topsham, Me.—Color white, 98% thru 140-mesh 19.00

Bedford Hills, N. Y.—Color, white; analysis, K_2O, 12.26%; Na_2O, 2.86%; SiO_2, 66.05%; Fe_2O_3, .08%; Al_2O_3, 18.89%; pulverized 78% thru 100 mesh, bulk, 11.00–14.00; crude, bulk, per ton 9.00

Trenton, N. J.—White; analysis, K_2O, 11%-13%; Na_2O, 1.5%-2.70%; SiO_2, 63%-67.80%; Fe_2O_3, .09%; Al_2O_3, 18.25%-20%; pulverized, 99.5% thru 200 mesh 20.00

Rochester, N. Y. 22.00

Los Angeles, Calif.—Color, white; analysis, K_2O, 12.16%; Na_2O, 1.53%; SiO_2, 65.60%; Fe_2O_3, .10%; Al_2O_3, 19.20%; Arizona spar, crude, bags, 12.50–14.00; bulk 11.00–12.50

Pulverized, 95% thru 200 mesh; bags, 19.73–23.50; bulk 15.75–22.50

Pulverized, 20% thru 80 mesh; bags, 17.60; bulk 16.50

Rumney and Cardigan, N. H.—Color, white; analysis, K_2O, 9-12%; Na_2O, trace; SiO_2, 64-67%; Al_2O_3, 17-18%, crude, bulk 7.00– 7.50

Rumney Depot, N. H.—Color, white; analysis, K_2O, 8-13%; Na_2O, 1-1½%; SiO_2, 62-68%; Al_2O_3, 17-18%, crude, bulk 7.00– 7.50

Penland, N. C.—White; crude, bulk 8.00

Ground, bulk 16.50

Spruce Pine, N. C.—Color, white; analysis, K_2O, 10%; Na_2O, 3%; SiO_2, 68%; Fe_2O_3, 0.10%; Al_2O_3, 18%; 99½% thru 200 mesh; pulverized, bulk 18.00

(Bags 15c extra.)

Tennessee Mills—Color, white; analysis, K_2O, 10%; Na_2O_3, 3%; SiO_2, 68%; 99½% thru 200 mesh; bulk (Bags, 15c extra) 18.00

Chicken Grits

Afton, Mich.—(Limestone), per ton	1.75
Belfast, Me.—(Limestone), per ton	‡10.00
Centerville, Iowa	9.25
Chico, Tex.—Hen size and Baby Chick, packed in 100-lb. sacks, per sack	1.00
Danbury, Conn.; Adams, Ashley Falls, and West Stockbridge, Mass.—(Limestone)	‡7.50–*9.00
Davenport, Ia.—(Limestone), bags, per ton	6.00
Easton, Penn.—In bags	8.00
El Paso, Tex.—Per ton	1.00
Knoxville, Tenn.—Per bag	1.25
Los Angeles, Calif.—Per ton, including sacks:	
Feldspar	14.00
Gypsum	7.50– 9.50
Marion, Va.—(Limestone), bulk, 5.00; bagged, 6.50; 100-lb. bag	.50
Middlebury, Vt.—Per ton (a)	10.00
Piqua, O. (b)—(Pearl Grit), fine and medium, per ton	¶8.00
Randville, Mich.—(Marble), bulk	6.00
Rocky Point, Va.—(Limestone), 100-lb. bags, 50c; sacks, per ton, 6.00; bulk	5.00
Seattle, Wash.—(Gypsum), bulk, per ton	10.00
Tuckahoe, N. Y.	8.00
Waukesha, Wis.—(Limestone), per ton	7.00
West Stockbridge, Mass.	7.50– 9.00
Wisconsin Points—(Limestone), per ton	15.00
Winona, Minn.—(Limestone), sacked, per ton, 8.00; bulk, per ton	6.00

*L.C.L. †Less than 5-ton lots. ‡C.L. ¶100-lb. bags.

(a) F.o.b. Middlebury, Vt. (b) F.o.b. Piqua, Ohio.

Sand-Lime Brick

Prices given per 1000 brick f.o.b. plant or nearest shipping point, unless otherwise noted.

Albany, Ga.	**11.00**
Barton, Wis.	10.50
Boston, Mass.	**17.00***
Brighton, N. Y.	**19.75***
Dayton, Ohio	12.50–13.50
Detroit, Mich. (h)	‖13.00–16.00*d
Farmington, Conn.	13.00
Flint, Mich.	18.00†
Grand Rapids, Mich.	12.50
Hartford, Conn.	13.00–17.00*
Jackson, Mich.	13.00
Lakeland, Fla.	10.00–11.00
Lake Helen, Fla.	9.00–12.00
Lancaster, N. Y.	12.50
Madison, Wis.	12.00–12.50a
Mishawaka, Ind.	11.00
Milwaukee, Wis.	13.00*
Minneapolis, Minn.	10.00
New Brighton, Minn.	10.00
Pontiac, Mich.	12.50
Portage, Wis.	15.00
Prairie du Chien, Wis.	18.00–22.50
Rochester, N. Y.	19.75
Saginaw, Mich.	13.50
San Antonio, Texas	12.50
Sebewaing, Mich.	12.50
Sioux Falls, S. Dak.	13.00
South River, N. J.	13.00
South St. Paul, Minn.	9.00
Syracuse, N. Y.	18.00–20.00
Toronto, Canada	11.50
Wilkinson, Fla.	12.00–16.00
Winnipeg, Canada	15.00

Delivered on job. ‖Dealers' price. (a) Less 50c disc. per M, 10th of month. (d) 5% disc., 10th of month. (f) In yard, 12.00, 12.25 and 12.50. (h) Also 15.50. (j) Also 14.00.

Portland Cement

	Per Bag	Per Bbl.	High Early Strength
Albuquerque, N. M.	.86¼	3.45	.....
Atlanta, Ga.	.....	2.26	3.16¶
Baltimore, Md.	.....	2.25	3.55¶
Birmingham, Ala.	.....	1.90	2.80¶
Boston, Mass. (g)	.57e	1.88–2.08	3.27¶
Buffalo, N. Y.	.62½	†2.05–2.33	3.35¶
Butte, Mont.	.90¼	3.61	.....
Cedar Rapids, Iowa	.....	2.24	.....
Charleston, S. C.	.....	2.25–2.55d	3.15¶
Cheyenne, Wyo.	.66½	2.66	.....
Chicago, Ill.	.....	2.05–2.45	3.35¶
Cincinnati, Ohio	.....	2.17–2.57	3.47¶
Cleveland, Ohio	.....	2.04–2.64	3.34¶
Columbus, Ohio	.....	2.22–2.62	3.52¶
Dallas, Texas	.....	1.80	3.39¶
Davenport, Iowa	.....	2.24	.....
Dayton, Ohio	.....	2.21–2.61	3.51¶
Denver, Colo.	.....	2.55	.....
Des Moines, Iowa	.....	2.14	.....
Detroit, Mich.	.....	1.95–2.35	3.25¶
Duluth, Minn.	.....	2.04	.....
Houston, Texas	.....	1.90	3.63¶
Indianapolis, Ind.	.54¾	2.09–2.49	3.39¶
Jackson, Miss.	.....	1.94–2.34	3.24¶
Jacksonville, Fla.	.....	2.51b	3.26¶
Jersey City, N. J.	.....	2.13–2.53	3.43¶
Kansas City, Mo.	.45½	1.82	3.22¶
Los Angeles, Calif.	.51½	2.06	.....
Louisville, Ky.	.55½	2.47	3.37¶
Memphis, Tenn.	.....	1.94–2.34	3.24¶
Milwaukee, Wis.	.....	2.20–2.60	3.50¶
Minneapolis, Minn.	.....	2.12–2.22	.....
Montreal, Que.	.....	1.60	.....
New Orleans, La.	.45½	1.82	3.22¶
New York, N. Y.	.60¾	1.93–2.43	3.33¶
Norfolk, Va.	.....	1.97	3.27¶
Oklahoma City, Okla.	.57¼	2.29	3.69¶
Omaha, Neb.	.54	2.16	3.56¶
Peoria, Ill.	.....	2.22	.....
Pittsburgh, Penn.	.....	2.05–2.45	3.35¶
Philadelphia, Penn.	.....	2.15	3.45¶
Phoenix, Ariz.	.....	3.91*	.....
Portland, Ore.‡	.....	2.40–2.50a	.....
Reno, Nev.‡	.....	2.91–3.41a	.....
Richmond, Va.	.....	2.32	3.62¶
Salt Lake City, Utah	.70¼	2.81	.....
San Francisco, Calif.‡	.....	2.21–2.71a	.....
Savannah, Ga.	.....	2.51c	3.15¶
St. Louis, Mo.	.48¾	1.95–2.35	‡3.25¶
St. Paul, Minn.	.....	2.12–2.22	.....
Seattle, Wash.	.....	†2.50–2.65j	‡3.50†
Tampa, Fla.	.....	2.40	3.30¶
Toledo, Ohio	.....	2.20–2.60	3.50¶
Topeka, Kan.	.50¼	2.01	3.41¶
Tulsa, Okla.	.53¼	2.13	3.53¶
Wheeling, W. Va.	.....	2.12–2.52	3.42¶
Winston-Salem, N. C.	.....	2.19	3.49¶
Mill prices f.o.b. in carload lots, without bags, to contractors.			
Albany, N. Y.	.43¾	1.75	.....
Bellingham, Wash.	.....	2.10	.....
Buffington, Ind.	.....	1.80	.....
Chattanooga, Tenn.	.....	2.45*	.....
Concrete, Wash.	.....	2.35	.....
Davenport, Calif.	.....	2.05	.....
Hannibal, Mo.	.....	1.90	.....
Hudson, N. Y.	.....	1.75	.....
Leeds, Ala.	.....	1.65	.....
Lime and Oswego, Ore.	.....	2.50‡	.....
Mildred, Kan.	.....	2.35	.....
Nazareth, Penn.	.....	2.15	.....
Northampton, Penn.	.....	1.75	.....
Richard City, Tenn.	.....	2.05	.....
Steelton, Minn.	.....	1.85	.....
Toledo, Ohio	.....	2.20	.....
Universal, Penn.	.....	1.80	.....

NOTE—Add 40c per bbl. for bags. *Includes sacks. †10c disc., 10 days. ‡10c disc., 15 days. (a) Includes cloth sacks returnable at 10c each. (b) 15c bbl. refund for paid freight bill. (c) 26c bbl. refund for paid freight bill. (d) 30c bbl. refund for paid freight bill. (e) Paid freight bill taken as part payment of invoice. (f) "Velo" cement, including cost of paper bag, 10c disc. 10 days. ¶"Incor" Perfected, prices per bbl. packed in paper sacks, subject to 10c disc. 15 days. (g) Also 2.33 per bbl. (j) 25c bbl. disc. 10 days.

Gypsum Products— CARLOAD PRICES PER TON AND PER M SQUARE FEET, F.O.B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco Calcined Gypsum	Cement and Gaging Plaster	Wood Fiber	Gaging White	Plaster Sanded	Cement Keene's	Finish Trowel	—Plaster Board— ½x32x 36". Per M Sq. Ft.	⅜x32x 36". Per M Sq. Ft.	Wallboard, ⅜x32 or 48" Lengths 6'-10'. Per M Sq. Ft.
Acme, Tex.	1.50–3.00	4.00	4.00	4.00–6.00	4.00–6.00	4.00–6.00	10.00	10.00	19.00	19.00	10.50	10.50	12.00
Blue Rapids, Kan.	1.50–3.00	4.00	4.00	4.00–6.00	4.00–6.00	4.00–6.00	10.00	10.00	19.00	19.00	10.50	10.50	12.00
Centerville, Iowa	.....	.....	6.00	7.00	.....	7.50	8.50	10.50e	.....	.....	.....	.....	.....
Delawanna, N. J.	.....	.....	.....	4.50–5.00	13.10–14.00	5.00	.....	7.25	.....	.....	.....	.....	25.00
East St. Louis, Ill.	Special Gypsum Products—Interior partition section, 4 in. wide, 12 in. thick and up to 10 ft. 6 in. long, per ton, 21.00; 6x6 in. and up to 10 ft. 6 in. long, per ton, 30.00; floor section, 7x16 in. and up to 13 ft. 6 in. long, per ton, 23.00.												
Ft. Dodge, Iowa; N. Holston, Va.; Akron, N. Y.	1.50–3.00	4.00	4.00	4.00–6.00	4.00–6.00	4.00–6.00	10.00	10.00	19.00	19.00	10.50	10.50	12.00
Grand Rapids, Mich.	1.50–3.00	4.00	4.00	4.00–6.00	4.00–6.00	4.00–6.00	10.00	10.00	19.00	19.00	10.50	10.50	12.00
Gypsum, Ohio	1.70–3.00	4.00	6.00	7.00–9.00	9.00	9.00	19.00	7.00	24.50	19.00	.....	15.00	20.00–25.00
Los Angeles, Calif. (f)	5.00	.....	7.50–9.50	12.20	.....	.....	12.20–14.10	13.10	29.00–40.00	11.20–13.10	.....	.....	33.75–41.25
Medicine Lodge, Kan.	.....	.....	.....	.....	.....	.....	.....	.....	15.00	.....	.....	.....	.....
Oakfield, N. Y.	**2.50**	.....	.....	**5.50**	**6.00**	**6.00**	.....	**5.50**	.....	.....	.....	**15.00**	**25.00**
Providence, R. I. (x)	.....	.....	.....	12.00–13.00o	.....	.....	.....	.....	.....	.....	**Partition block, solid reinforced, 12x30x3", 7c per sq. ft. in truck lots**		
Seattle, Wash.	.....	.....	10.50m	12.00m	13.00	.....	14.00	.....	.....	.....	.....	.....	.....
Winnipeg, Man.	5.00	5.00	7.00	13.00	14.00	14.00	.....	.....	.....	.....	20.00w	25.00	33.00

NOTE—Returnable bags, 10c each; paper bags, 1.00 per ton extra (not returnable. (a) Hardwall plaster, 13.00; casting, finishing molding, 14.00; (b) Calacoustic plaster, 10.00 at mill; (c) Plaster lath; (d) ¼x48x36 in.; (e) white molding; (f) plasterboard, 18c to 20c per yd.; (m) includes paper bags; (o) includes jute sacks; (u) includes sacks; (v) retail, 35.00; (w) 16x48; (x) 2- and 3-in. "Fabricaste" gypsum blocks, 8½c per sq. ft., f.o.b. job.

Market Prices of Cement Products and Slate

Concrete Block

Prices given are net per unit, f.o.b. plant or nearest shipping point.

City or shipping point	Size 8x8x16
Camden, N. J.	16.50
Cement City, Mich.	55.00¶
Chicago District‖	180.00–210.00a
8x10x16	230.00–260.00a
8x12x16	280.00–330.00a
Columbus, Ohio	15.00c– 17.00†
Detroit, Mich. (d)	.15– .17†
Forest Park, Ill.	21.00*
Grand Rapids, Mich.	11.00*
Graettinger, Iowa	.18– .20
Indianapolis, Ind.	.10– .12a
Los Angeles, Calif.	4x8x12–5.00*
Olivia and Mankato, Minn.	9.50b
Somerset, Penn.	.18– .20
Tiskilwa, Ill.	.16– .18†
Yakima, Wash.	20.00*

*Price per 100 at plant. †Rock or panel face. ‡Delivered. ¶5x8x12, 55.00 per 1000. (a) Face. (b) Per ton. (c) Plain. (d) 8x12x16, rock or panel face, .24–.26.

Cement Building Tile

Camden and Trenton, N. J.:	
3x8x16, per 100, 9.00; 3x9x16, per 100	9.00
4x8x16, per 100, 12.00; 4x9x16, per 100	13.00
6x8x16, per 100, 16.50; 6x9x16, per 100	15.50
Cement City, Mich.:	
5x8x12, per 100	5.00
Chicago District (Haydite):	
4x 8x16, per 100	13.00
8x 8x16, per 100	20.00
8x12x16, per 100	28.00
Columbus, Ohio:	
5x8x12, per 100	6.00
Detroit, Mich.:	
5½x8x12, per M	75.00
Grand Rapids, Mich.:	
5x8x12, per 100	6.00
Longview, Wash.:	
4x6x12, per 100	5.00
4x8x12, per 100	6.25
Mt. Pleasant, N. Y.:	
5x8x12, per M	78.00
Houston, Texas:	
5x8x12 (Lightweight), per M	80.00

Cement Roofing Tile

Prices are net per square, carload lots, f.o.b. nearest shipping point, unless otherwise stated.

Camden and Trenton, N. J.—8x12, per sq.:	
Red	15.00
Green	18.00
Cicero, Ill.—French and Spanish tile (red, orange, choc., yellow, tan, slate, gray) per sq., 9.50–10.00; green or blue, per sq.	11.50–12.00
Detroit, Mich.—5x8x12, per M	67.50
Houston, Texas—Roofing Tile, per sq.	25.0.
Indianapolis, Ind.—9x15-in.	Per sq.
Gray	10.00
Red	11.00
Green	13.00
Wildasin Spur, Los Angeles, Calif. (Stone-Tile):	
3½x6x12, per M	50.00
3½x8x12, per M	60.00
Prairie du Chien, Wis.:	
5x8x12, per M	82.00
5x4x12, per M	46.00
5x8x6 (half-tile), per M	41.00
5x8x10 (fractional), per M	82.00
Yakima, Wash. (Building Tile):	Each
5x8x12	.10

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	22.00	25.00– 40.00
Baltimore, Md. (Del. according to quantity)	15.50	22.00– 50.00
Camden & Trenton, N. J.	17.00	.....
Chicago District "Haydite"	14.00	.....
Columbus, Ohio	16.00	17.00
El Paso, Tex.—Klinker	10.00	.....
Ensley, Ala. ("Slagtex")	12.50	.....
Eugene, Ore.	25.00	35.00– 75.00
Forest Park, Ill.	.....	37.00
Friesland, Wis.	22.00	32.00
Longview, Wash.*	15.00	22.50– 65.00
Los Angeles, Calif.	12.50	.....
Milwaukee, Wis.	14.00	32.00
Mt. Pleasant, N. Y.	.....	14.00– 23.00
Omaha, Neb.	18.00	30.00– 40.00
Pasadena, Calif.	10.00	.....
Philadelphia, Penn.	15.50	.....
Portland, Ore.	17.50	23.00– 55.00
Mantel brick—100.00–150.00		
Prairie du Chien, Wis.	14.00	22.50
Rapid City, S. D.	18.00	30.00– 40.00
Waco, Texas	16.50	32.50–125.00
Watertown, N. Y.	20.00	35.00
Westmoreland Wharves, Penn.	14.75	20.00
Winnipeg, Man.	14.00	22.00
Yakima, Wash.	22.50	.....

*40% off List.

Stone-Tile Hollow Brick

Prices are net per thousand f.o.b. plant.

	No. 4	No. 6	No. 8
Albany, N. Y.*†	40.00	60.00	70.00
Asheville, N. C.	35.00	50.00	60.00
Atlanta, Ga.	26.50	45.00	53.00
Brownsville, Tex.	.....	53.00	62.50
Brunswick, Me.†	40.00	60.00	80.00
Charlotte, N. C.	35.00	45.00	60.00
De Land, Fla.	30.00	50.00	60.00
Farmingdale, N. Y.	37.50	50.00	60.00
Houston, Tex.	35.00	45.00	60.00
Jackson, Miss.	45.00	55.00	65.00
Klamath Falls, Ore.	65.00	75.00	85.00
Longview, Wash.	.....	55.00	64.00
Los Angeles, Calif.	29.00	39.00	45.00
Mattituck, N. Y.	45.00	55.00	65.00
Medford, Ore.	50.00	55.00	70.00
Memphis, Tenn.	50.00	55.00	65.00
Mineola, N. Y.	45.00	50.00	60.00
Nashville, Tenn.	30.00	49.00	57.00
New Orleans, La.	35.00	45.00	60.00
Norfolk, Va.	35.00	50.00	65.00
Passaic, N. J.	35.00	50.00	65.00
Patchogue, N. Y.	.....	60.00	70.00
Pawtucket, R. I.	35.00	55.00	75.00
Safford, Ariz.	32.50	48.75	65.00
Salem, Mass.	40.00	60.00	75.00
San Antonio, Tex.	37.00	46.00	60.00
San Diego, Calif.	35.00	44.00	52.50

Prices are for standard sizes—No. 4, size 3½x4x12 in.; No. 6, size 3½x6x12 in.; No. 8, size 3½x8x12 in. *Delivered on job. †10% disc.

Wholesale Prices of Slate

Prices given are f.o.b. at producing point or nearest shipping point

Slate Flour

Pen Argyl, Penn.—Screened, 200 mesh (94-96% thru 300 mesh), $7.00 per ton in paper bags.

Slate Granules

Esmont, Va.—Blue. $7.50 per ton.

Granville, N. Y.—Red, green and black, $7.50 per ton.

Pen Argyl, Penn.—Blue-black, 6.50 per ton.

Roofing Slate

Prices per square—Standard thickness.

City or shipping point:	3/16-in.	¼-in.	⅜-in.	½-in.	¾-in.	1-in.
Buckingham, Oxford, gray	13.88	19.44	24.99	29.44	34.44	45.55
Bangor, Penn.—No. 1 clear	10.50–14.50	24.50	29.00	33.50	44.50	55.60
No. 1 ribbon	9.00–10.25	20.00	24.50	29.00	40.00	51.25
Gen. mediums	9.50–11.25	.....	.....	.....	.....	.....
No. 2 ribbon	6.75– 7.25	.....	.....	.....	.....	.....
No. 1 Albion clear	7.25–10.50	16.00	23.00	27.00	37.00	46.00
Albion mediums	8.00– 9.00	.....	.....	.....	.....	.....
Chapman Quarries, Penn.—No. 1	8.50–11.25	(Vari-tone, 12.00–13.00)				
Medium	7.75– 9.00	.....	.....	.....	.....	.....
Hard vein	.....	16.00	23.00	26.00	32.00	40.00
Granville, N. Y.—Sea green, weathering	14.00	24.00	30.00	36.00	48.00	60.00
Semi-weathering, green and gray	15.40	24.00	30.00	36.00	48.00	60.00
Mottled purple and unfading green	21.00	24.00	30.00	36.00	48.00	60.00
Red	27.50	33.50	40.00	47.50	62.50	77.50
Monson, Maine	19.80	24.00	.....	.....	.....	.....
Pen Argyl, Penn.*						
Graduated slate (blue)	.....	16.00	23.00	27.00	37.00	46.00
Graduated slate (grey)	.....	18.00	25.00	29.00	39.00	48.00
Color-tone	11.50–12.50; Vari-tone, 12.00–13.00; Cathedral gray, 14.00–15.00					
No. 1 clear (smooth text)	7.25–10.50; No. 1 clear (rough text), 8.25–9.50					
Albion-Bangor medium	8.00–9.00; No. 2 clear, 8.00–9.00; No. 1 ribbon, 8.00–8.50					
Matedale and Slatington, Penn.—						
Genuine Franklin	11.25	22.00	26.00	30.00	40.00	50.00
Blue Mountain No. 1	10.50	22.00	26.00	30.00	40.00	50.00
Blue Mountain No. 1 clear	9.50	18.00	22.00	26.00	36.00	46.00
Blue Mountain No. 2 clear	8.00	18.00	22.00	26.00	36.00	46.00

(a) Prices are for standard preferred sizes (standard 3/16-in. slates), smaller sizes sell for lower prices.
(b) Prices other than 3/16-in. thickness include nail holes.
(c) Prices for punching nail holes, in standard thickness slates, vary from 50c to $1.25 per square.
*Unfading grey, 10.50–12.50; textural, 12.00–15.00; 10% disc. to roofer; 10%–8⅓% to wholesaler.

Cement Drain Tile

Graettinger, Iowa.—Drain tile, per foot: 5-in., .04½; 6-in., .05½; 8-in., .09; 10-in., .12½; 12-in., .17½; 15-in., .35; 18-in., .50; 20-in., .60; 24-in., 1.00; 30-in., 1.35; 36-in.	2.00
Longview, Wash.—Drain tile, per foot: 3-in., .05; 4-in., .06; 6-in., .10; 8-in., .15; 10-in.	.20
Olivia and Mankato, Minn.—Cement drain tile, per ton	8.00
Tacoma, Wash.—Drain tile, per 100 ft.	
3-in.	4.00
4-in.	5.00
6-in.	7.50
8-in.	12.00
Waukesha, Wis.—Drain tile, per ton	8.00

Current Prices Cement Pipe

Prices are net per foot f.o.b. cities or nearest shipping point in carload lots unless otherwise noted

Culvert and Sewer	4 in.	6 in.	8-in.	10 in.	12 in.	15-in.	18 in.	20 in.	22 in.	24 in.	27 in.	30 in.	36 in.	42 in.	48 in.	54 in.	60 in.
Detroit, Mich. (c)																	
Sewer	.10	.12	.22	.30	.40	.60	.90	1.20	.....	1.75	2.00	2.50	3.30	4.50	5.75	6.50	8.00
Culvert	.....	.....	.....	.....	.95	1.25	1.60	.....	.....	2.25	2.50	3.00	3.50	5.00	6.50	8.00	10.00
Grand Rapids, Mich. (b)	.....	.....	.....	.60	.70	.90	1.20	.....	.....	1.80	2.10	2.35	3.50	4.00	5.60	6.90	7.85
Houston, Texas	.....	.19	.28	.43	.55½	.90	1.30	.....	1.70†	2.20	.....	.....	.....	.....	.....	.....	.....
Indianapolis, Ind. (a)	.....	.....	.....	.75	.85	.90	1.15	.....	.....	1.60	.....	2.50	.....	.....	.....	.....	.....
Mankato, Minn. (b)	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.50	1.75	2.50	3.25	4.25	.....	.....	.....
Newark, N. J.	6 in. to 24 in., 18.00 per ton																
Norfolk, Neb. (b)	.....	.....	.....	.....	.90	1.00	1.13	1.42	.....	.....	2.11	.....	2.75	3.58	.....	6.14	.....
Paullina, Iowa‡	.....	.....	.....	.....	.....	.....	.....	.....	2.25	.....	2.11	.....	2.75	3.58	.....	6.14	.....
Somerset, Penn.	.....	.....	.....	.....	1.08	1.25	1.65	.....	.....	2.50	.....	3.65	4.85	7.50	8.50	.....	.....
Tiskilwa, Ill. (rein.)	.....	.....	.....	.75	.85	.95	1.20	1.60	.....	2.00	.....	2.75	3.40	.....	6.50	.....	10.00
Tacoma, Wash.	.15	.17	.22½	.30	.40	.55	.70	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Wahoo, Neb. (b)	.....	.....	.....	.....	.85½	.....	114	.....	.....	1.81	.....	2.47	3.42	4.13	5.63	6.49	7.31
Yakima, Wash.	.....	.....	.....	.....	.....	.....	1.42	.....	.....	2.11	.....	2.75	3.58	4.62	6.14	6.96	7.78

(a) 24-in. lengths. (b) Reinforced (c) Delivered on job; 5% discount, 10th of month. †21-in. diameter. ‡Price per 2-ft. length.

News of All the Industry

Incorporations

Wabash Portland Cement Co., Stroh, Ind. Number of directors increased from seven to eight.

Continental-Fiske, New York, N. Y.; 2000 shares common. Building materials.

Venango Stone Co., Inc., Jersey City, N. J., $125,000.

Commonwealth Sand Co., Boston, Mass. Paul P. Bird, 88 Broad St., Boston, treasurer.

Louisiana Sand and Gravel Co., Inc., New Orleans, La.; $50,000. Charles D. Hightower, 618 Maison Blanche Bldg.

Denton Sand and Gravel Co., Denton, Texas.; $5000. W. M. Jagoe, W. D. Hollers and Hugh Keel.

Staten Island Sand and Gravel Co., Staten Island, N. Y.; $20,000. E. Gettinger, 1501 Broadway, New York, N. Y.

Chicago Cement Products Co., Elmwood Park, Ill., has changed name to West Side Fuel and Supply Co.

Maitland Gypsum Co., Boston, Mass.; $300,000. Daniel W. Donahue, Cambridge; Henry W. Sprague, Wakefield; Hazel E. Morin, Boston.

Crab Orchard Stone Co., Inc.; 500 shares at $100 each and 750 shares no par. John Oman, Jr., Stirton Oman and John Oman III.

Marine Sand and Gravel Co., Chicago, Ill.; 100 shares no par. L. J. Rech, B. L. Hoskins, T. P. Murray.

Illinois Lime and Cement Co., Chicago, Ill.; $1,300,000. E. C. Kohlsaat, D. H. Mann, F. H. Crowley, et al.

Universal Concrete Products Co., Washington, D. C.; $50,000. L. Francis, S. Browne, 1501 Farragut Ave., N.W.

Consolidated Mica Co., Spruce Pine, N. C.; $100,000. W. D. Richardson, Erwin, Tenn.; John V. Cox and James Maberry, Spruce Pine.

Kennerlyte Quarries, Inc., Thomasville, N. C.; $100,000. J. W. Brawley, D. L. Kennerly, Greensboro.

Dudley Black Quarry Co., Gleason, Wis.; 250 shares $100 each. R. Dudley, W. E. Dudley, P. and M. Van Hecke. Granite quarrying operations.

Calumet Concrete and Materials Co., Chicago, Ill.; 10,000 shares no par common. Henry F. Tenney, John Reynolds and Simon Beemsterboer.

Eugene W. Smith, Inc., Evansville, Ind.; $5000. To deal in sand, stone, etc. E. W. Smith, Jr., E. W. Smith and J. D. O'Donnell.

Port Crescent Sand and Fuel Co., Madison, Wis.; capital stock $200,000; paid in $94,130. W. I. Sallee, Milwaukee.

Bosardville Limestone Co., Bethlehem, Penn.; $25,000. W. Arthur Schneller, Charles F. Schwartz and John H. Diefenderfer.

Gypsum Products Sales Corp., Boston, Mass.; 5000 no par shares. Richard B. Constantine, Boston; Austin M. Pinkham, Winchester; Edna R. Armstrong, Boston.

New Hyde Park Sand and Gravel Co., Inc., Queens, N. Y.; $20,000. Pietro Portenza, Queens; Guiseppe Amirati, Woodhaven, and Irving Joludow, Bellaire.

Quarries

North Carolina Granite Corp. and the **J. D. Sargent Granite Co.**, Mt. Airy, N. C., have moved into their new four-story office building.

Ashland, Mo. The state highway department is planning to open a quarry on the Hartman farm, to be operated by convict labor.

Cookeville Marble and Granite Works, Cookeville, Tenn., is now owned by C. E. Wilson, C. Jared and Eugene Jared, L. D. Bockman having disposed of his interest in the firm to the above.

France Stone Co. set off a 10,000-lb. blast at its Bloomville, Ohio, quarry recently. It was estimated that about 52,000 tons of rock were dislodged by the blast.

Hawkeye Quarries, Glory, Iowa, recently donated 3000 cu. yd. of crushed stone to the Spring Creek township. The stone was used in improving the road between La Porte City and Brandon, Iowa.

Muncie Stone and Lime Co., Muncie, Ind., has sold the Mock quarry to the Central Indiana Gas Co. The quarry, at which no work has been done in recent years, will be used as a water reservoir by the gas company.

Independent Lime and Stone Co.'s property at Lake Church, Wis., has been sold in a bankruptcy sale for $2000 to Clarence Hill, a Port Washington banker. The sale, however, is subject to the approval of the federal court.

Wentworth Quarries' building at Vinemount, near Hamilton, Ont., was struck by lightning and damaged by fire on July 24. The loss was estimated at $90,000. The plant is a subsidiary of Doolittle, Ltd., of Hamilton, Ont., owner of several quarries in Ontario.

W. P. Soder has become the sole owner of the Soder-Molin Granite Works, Sand Rapids, Minn., purchasing the interest of his partner, Carl Molin, of St. Cloud. Mr. Soder contemplates making several improvements including an elargement of the plant in the near future.

National Lime, Cement and By-Products Corp., Buffalo, N. Y., has completed a detailed survey of its property at Tuscumbia, Ala., and will soon ask for bids on equipment. Autery Engineering Co. are the engineers. S. L. Huff is secretary of the National company.

A. W. Hammond is planning the development of a 40-acre quarry site at Raymond, Wash. Contract for a road to the new development has been let and installation of crushing and screening equipment is expected to begin soon. Operation will start in September.

Green Tree Quary, Quarryville, Penn., has been sold by W. B. Aierstuck to Hartman Brothers of Mountville, Penn. The sale, which includes a 62-acre tract and Mr. Aierstuck's summer home, was made for about $15,000, it was understood. The new owners will continue to operate the quarry along the same lines as in the past, it is said.

Fountain County, Ind., has leased for five years an outcrop of limestone near Mill Creek. The lease covers sufficient acreage and calls for a royalty of 15c per ton for the stone and 25c per ton for coal removed and used. Crushing machinery has been purchased second-hand and will be installed on the site.

Standard Lime and Stone Co. has reopened its Sylvester quarry, near Fond du Lac, Wis., for the production of a new flagstone material to be used for landscaping in the Chicago district. The "art stone" produced is in good demand by architects who have turned to the use of a weathered and rustic stone. Specifications call for at least 25% red iron oxide (rust) in the exposure.

Fort Collins, Colo. Work on the Ingleside branch line to the new limestone quarries in the Owl Canyon region will begin early in August by the Colorado and Southern railroad. The extension will be 4¾ miles long and will cost $110,000. The quarries are about 2½ miles by direct line from the present terminus of the branch. All 85-lb. steel rail will be used on the extension.

Sand and Gravel

Aberdeen Sand and Gravel Co., Aberdeen, N. C., is installing a dragline for removal of overburden and for loading material to cars.

Helena, Mont. The new city-operated gravel plant near Helena has started production. A gasoline dragline has been installed for loading trucks, replacing previous hand shoveling.

Salem, Ore. Pierce Collard gravel plant, 10 miles north of Salem, is expected to be in operation shortly. The plant will supply material for improvement on the Million Dollar highway.

Copiah Gravel Co., Jackson, Miss., operating gravel pits about two miles to the northeast of town, has recently completed an order for 1000 cars of its product. The new Canton and Carthage railroad used the gravel in its construction work.

Washington County Sand and Gravel Co., Hanover, Kan., organized and started last year by Lincoln, Neb., capital, has received orders for 300 carloads of gravel for highway improvements, to be shipped to Hollis and Concordia in Cloud county.

Marion County Sand and Gravel Co., Indianapolis, Ind., has been placed in receivership, according to the Indianapolis (Ind.) News. The suit for receivership is described as friendly, the object being to place the affairs of the company on a sound basis. Frank J. Noll was named receiver.

Lyman-Richey Sand and Gravel Co., of Omaha, is operating its pit north of the city at full capacity now in order to supply the demand for gravel for road construction work in Iowa. The company opened its pits here last year, after having about exhausted the available supply on its land at Louisville.

Superior, Wis. The Northern Pacific railroad has donated 2000 tons of gravel to the city for use in grading the old Stinson Ave. road. The gravel will be loaded at the company's Carlton plant free of charge, a transporting charge of 92.2c. per yard being the only cost borne by the city.

Granite Sand and Gravel Co., formerly the Lick Creek Sand and Gravel Co. of Indianapolis, has started operations at its plant located on the Bluff road southwest of Indianapolis. Homer Rodeheaver is president, J. N. Rodeheaver is vice president and C. W. Stephens, who has been in the gravel business 15 years, is secretary and general manager.

Cement

Marquette Cement Manufacturing Co. has let the contract to Gamble Construction Co., St. Louis, Mo., for a storage and distributing plant to cost about $90,000 with equipment.

Lime

Dr. Frank Baker, of Bloomsburg, Penn., has purchased the quarries and lime plant of Low Brothers and Co., at Lime Ridge, Penn.

Southland Lime Co., Nashville, Tenn., has suspended operations at its Arlington, Tenn., lime plant, according to a report in the *Nashville* (Tenn.) *Tennessean*. The Southland company has operated the plant for about two years, succeeding the Rauscher interests in its ownership.

Agricultural Limestone

Illinois Agricultural Association reports a gain of 24,000 tons of agricultural limestone used on Illinois farms during 1928. The consumption for 1927 was 741,325 tons. Every county in the state was a user, five counties using more than 20,000 tons each. Three of these were in the wheat growing areas in the southwestern part of the state.

Agricultural officials pointed out that this large gain was registered despite the fact that the winter of 1927-1928 was severe and resulted in the winter killing of much of the wheat in the largest limestone using area of the state about East S. Louis. Farmers in that territory were left without the usual cash crop which they depend upon to pay for their limestone.

Cement Products

Bent Concrete Pipe Co., Fort Worth, Tex., has acquired a 10-acre site at West Dallas, Tex., and is planning to erect a $100,000 plant.

Shelton Concrete Products Co., Shelton, Wash., is now manufacturing "Supertile" for bearing walls, partitions and fire walls.

Ready-Mixed Concrete Co., a new concern headed by John L. Humbard, president of the Tennessee State Road Contractors' Association, is installing a plant at Knoxville, Tenn. It will represent an investment of $100,000.

Elkan Stone Tile Manufacturing Co., Marion, Ga., is now producing from 7000 to 8000 stone tile per day or about double the intial production of the plant which was opened two years ago. The plant uses crushed slag aggregate in its cast stone products which include many varieties of building tile, garden furniture and reinforced burial valuts.

West Texas Concrete Products Co. has been organized in San Angelo, Tex., to engage in the

manufacture and distribution of "Concho-crete" building tile, concrete pipe, and other products. Equipment has been purchased in Adrian, Mich., and will be on hand within a short time. E. V. Spence, former city manager; E. P. Sames and H. E. Sames constitute the owners of the business.

Bremerton, Wash. The Navy Yard has just received an allotment of $50,000 for the construction of a new concrete mixing plant to replace the old one at the west end of the yard, which is inadequate because of insufficient capacity. The new plant will house the $4,500 cement mixer purchased by the yard in January and will be equipped with the latest type of modern devices. The equipment of the plant will include a batch weigher, cement and aggregate elevators and a three-compartment storage bin for sand and stone. Work will probably be started on the new plant in the fall.

Gypsum

Standard Gypsum Co. is distributing interesting little catalogs on the uses of gypsum for the garden and farm.

Seth Lee, 103 Longwood Ave., Brookline, Mass., has recently organized a company to take over 400 acres of gypsum land in Nova Scotia. Only raw ground gypsum will be produced.

Miscellaneous Rock Products

Tennessee Mineral Products Co., Spruce Pine, N. C., has started work at two mines located on Cane Creek. Modern machinery is to be installed to produce best grades of potash feldspar.

Southern Amesite Asphalt Co., Lexington, Ky., is building a branch plant at North 34th St. and 4th Ave., Birmingham. A brick and steel building is being erected at a cost of about $15,000.

Raybestos Manhattan Co. has been formed with a capitalization of $30,000,000 as a result of a merger of the United States Asbestos Co., of Manheim, Penn.; Raybestos Co., of Bridgeport, Conn., and the Manhattan Rubber Manufacturing Co., of Passaic, N. J.

Personals

W. H. Kretz has joined the transformer sales department of the Wagner Electric Corp., St. Louis, Mo.

D. F. Scott has taken up his duties as the Portland, Ore., representative of the United States Gypsum Co.

Harold S. Falk, vice-president and works manager of Falk Corp., Milwaukee, has been appointed chairman of the committee on industrial education of the National Metal Trades Association.

E. M. Herr, vice-chairman of the board, Westinghouse Electric and Manufacturing Co., has recently compiled a comprehensive survey entitled "American Ships and American Prosperity."

R. P. Blackmer of the Blackmer-Franklin Limestone Co., Nashville, Tenn., has been elected president of the Nashville Retail Credit Association.

J. J. Kelley of Chicago has been appointed works manager of the United States Gypsum Co. plant at Port Clinton, Ohio, to succeed Edgar R. Hill, who has been transferred to New York.

G. W. Foote has been appointed factory manager of the Perfex Corp., Milwaukee Wis. Mr. Foote was for many years general superintendent in charge of production at the Republic Metal Ware Co., Buffalo, N. Y.

Benjamin Dixon has become sales manager in charge of Chicago and Detroit offices of the Ohio Locomotive Crane Co. Mr. Dixon was formerly sales manager of the Industrial Works, Bay City, Mich.

H. E. Green has taken on the promotion and sales of Moore speed cranes, shovels, draglines and also the Buffalo-Manitowoc clamshell buckets in the Philadelphia, Maryland and Washington, D. C., territories.

George H. Rupp has been appointed superintendent of the Minnequa, Colo., limestone quarries and iron mines of the Colorado Fuel and Iron Co., succeeding L. B. Weed. Mr. Rupp has been a consulting engineer with the Calumet and Hecla Copper Co., Calumet, Mich., and was mining supervisor for the Ford Motor Co. for several years.

W. M. Sutton has been appointed manager of the Pittsburgh office, W. A. Jones Foundry and Machine Co. Mr. Sutton was formerly in charge of the St. Louis office of the company and before that spent several years in the company's manufacturing and engineering office at Chicago.

Harlowe Hardinge, vice-president and general manager of the Hardinge Co., New York, has left for an extended busines trip through the middle western and western states. Before returning, Mr. Hardinge expects to visit British Columbia and other mining centers of Canada.

T. C. Taylor has resigned his position as assistant traffic manager of the International Cement Corp. in New York to assume the traffic managership of the Republic Portland Cement Co. of San Antonio, Texas. Previous to joining the International corporation Mr. Taylor was with the Texas Portland Cement Co. of Dallas, an International subsidiary.

Charles E. Eveleth, who since 1927 has been a vice-president of the General Electric Co. associated with C. C. Chesney and W. R. Burrows in the management of the manufacturing department of the company, has been transferred to the engineering department, and as vice-president will be associated with E. W. Allen in the direction of that department's affairs.

Lewis C. Lewis has been appointed safety engineer for the Ottawa county, Ohio, district, a position recently created by the Ohio Industrial Commission. His new duties include visits to the mines in the district, among them being several gypsum mines, and the arrangement of safety meetings for mine supervisors and workers, with the idea of establishing the co-operation of miners and operators in procuring the maximum of safety.

Obituaries

William T. McDonald, general foreman of the Lawrence Stone and Gravel Co., Columbia, S. C., was killed instantly by an electrical shock, on July 16th. The accident was caused when a short circuit occurred in a wet pit about 60 ft. from where Mr. McDonald was standing with one hand on a locomotive engine and his foot on the steel track.

Manufacturers

Merco Nordstrom Valve Co., San Francisco, Calif., has opened a branch office at 11 S. Virginia St., El Paso, Tex.

Prest-O-Lite Co., Inc., has recently added two new acetylene gas plants at Wichita, Kan., and Youngstown, Ohio.

Transit Mixers, Inc., San Francisco, Calif., supplied Hudson and Co., of Oakland, Calif., the builders for the Port of Oakland, Calif.

Allis-Chalmers Manufacturing Co., Milwaukee, Wis., has moved its offices from Second National Bank Bldg. to 819 Ohio Bldg.

General Electric Co. on July 26th mailed to its 55,000 stockholders, along with their dividend checks, annual passes entitling holder to inspect any of the company's factories.

Perfex Corp., Milwaukee, Wis., announce the placing of a large production order by the Allis-Chalmers Manufacturing Co. with them for United Tractor radiators.

Ingersoll-Rand Co., New York, announces receipt of an order from the Illinois Central Railroad Co. for five 600-hp. oil-electric locomotives from Ingersoll-Rand Co. and General Electric Co.

Westinghuse Electric and Manufacturing Co. has brought out an illustrated booklet on the electric installation at the new Atlantic City, N. J., municipal auditorium and convention hall.

Manitowoc Engineering Works, Manitowoc, Wis., is having a series of sales conferences in Manitowoc with its various distributors throughout the country.

Hercules Motors Corp., Canton, Ohio, is planning the expenditure of $500,000 for new buildings and equipment which will increase capacity over 50%.

Thew Shovel Co. and Universal Crane Co. announce removal of their Pittsburgh offices to Suite 1806 Benedum-Trees Bldg., 221 Fourth Ave., Pittsburgh.

Yale and Towne Manufacturing Co., Stanford, Conn., has purchased the Stuebling-Cowan Co., Cincinati, Ohio. The purchase of the company adds a complete line of single- and multiple-lift hand trucks to the Yale line.

American Hoist and Derrick Co., St. Paul, Minn., announces the removal of its office from 139 Townsend St., San Francisco, to 5515 Doyle Ave., Emeryville, Oakland, Calif. Boyd Nixon, who was in charge of the San Francisco office, will continue in charge.

Empire Steel Castings, Inc., Reading, Penn., has ben recently incorporated to take over business and assets of the Empire Steel Casting Co., and will carry on the business developed by the late company in high grade electric alloy and carbon steel castings. The officials of the new organization are: Frank Hodson, president; Charles Shipman Payson, Wallace E. Belcher, J. A. Osherman, D. W. Phillips, directors; J. E. Horton, secretary-treasurer.

Trade Literature

Variable Speed Transmission. Catalog on Reeves variable speed transmission. REEVES PULLEY CO., Columbus, Ind.

Liquid Oxygen Explosive. A non-technical illustrated description of "Loxite," developed by KEITH DUNHAM CO., Chicago, Ill.

Health Supervision in Industry. Health Practices Pamphlet No. 5 of the National Safety Council, Chicago, Ill.

Waterproofing Compound. Pamphlet containing signed testimonials from users of "Inertol" on concrete. INERTOL CO., INC., New York City.

Locomotives. Booklet on uses, economy and advantages of internal combustion engine drive for locomotives. GEO. D. WHITCOMB CO., Rochelle, Ill.

Superheater. Bulletin T-19 on "Elesco" multiple-loop, single-pass Superheater, non-technically illustrated. THE SUPERHEATER CO., New York, N. Y.

Locomotveis. Illustrated pamphlet giving names of users of Whitcomb locomotives in the cement industry. GEO. D. WHITCOMB CO., Rochelle, Ill.

Crushers. Folder listing names of users of "Bulldog" jaw crushers in the rock products industry. TRAYLOR ENGINEERING AND MANUFACTURING CO., Allentown, Penn.

Besser Tampings. Illustrated brochure on the complete line of Besser concrete products equipment. BESSER MANUFACTURING CO., Alpena, Mich.

Concrete Facts. Booklet briefly describing the "Transit" system of ready-mixed concrete and Paris "Transit" mixers. TRANSIT MIXERS, INC., San Francisco, Calif.

Air Compressors. Bulletin No. 147 on new single-stage air compressor describes and illustrates Pennsylvania methods of compressor regulation. PENNSYLVANIA PUMP AND COMPRESSOR CO., Easton, Pa.

Conveyor Scales. Illustrated bulletin on the "Telepoise" especially developed indicating, registering and recording conveyor device for weighing material in transit on conveyors. JOHN CHATILLON AND SONS, New York City.

Sling Chains. New catalog on sling chains giving information as to the diameter and dimension of joiner and end links. To be distributed about September 1st by the S. G. TAYLOR CHAIN CO., Hammond, Ind.

Magnetic Starters. Illustrated leaflet No. 1661-D describes the new classes, 13-125 and 13-225, of magnet starters for use with wound rotor induction motors. Construction details and distinctive features of magnetic starters are given. WESTINGHOUSE ELECTRIC AND MANUFACTURING CO., East Pittsburgh, Penn.

Lightweight Concrete Tile. New illustrated catalog on "featherweight" concrete insulating roof slabs. Some data on their manufacture and detail drawings of the slabs, illustrations of various buildings where they have been used, specifications, weights, etc., are included. FEDERAL CEMENT TILE CO., Chicago, Ill.

Arc Welding Equipment. Illustrated leaflet No. 20421 on multiple operator arc welding presenting the application, distinctive features and general principles of construction of different types of stationary and portable multiple operator arc welding sets. WESTINGHOUSE ELECTRIC AND MANUFACTURING CO., East Pittsburgh, Penn.

Air Filters. S. G. Sylvan, research engineer of Midwest Air Filters, Inc., and Prof. Samuel E. Dibble of Carnegie Institute of Technology have collaborated on an interesting book entitled "Man's Conquest of the Air," giving the history of research in dust elimination and analyzing the centrifugal air cleaning principle and the important part it has played in control of the air. MIDWEST AIR FILTERS, INC., Bradford, Penn.

G-E Bulletins. GEA-214-A. Helicoil sheath-wire immersion heaters for heating water, oil, etc. **GEA-994A.** Travel carriage for automatic arc welders, with single and double welding head. **GEA-1118.** Two-stage reciprocating air compressors, types CP-, CPQ- and CPT-26, for railway and industrial service. **GEA-1119.** Single-stage, stationary reciprocating air-compressor sets. **GEA-1120.** Two-stage, stationary reciprocating air-compressor sets. **GEA-1121.** Single-stage, portable reciprocating air-compressor sets. **GEA-881B.** Gas-engine driven arc welder, type WD-200A. GENERAL ELECTRIC CO., Schenectady, N. Y.